

Drainage Reports  
Abbreviated Water & Sewer Need Reports  
Water Study  
Wastewater Study  
Stormwater Waiver Application



"LEED®ing and Developing Smart Projects"

# PRELIMINARY DRAINAGE REPORT MUSEUM SQUARE

2<sup>nd</sup> Steet and Marshall Way  
Scottsdale, AZ

**Stormwater Review By:**

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Review Cycle \_\_\_\_\_ Date 9/5/18

*Approved*

**Prepared For:**



**MACDONALD  
DEVELOPMENT CORPORATION**

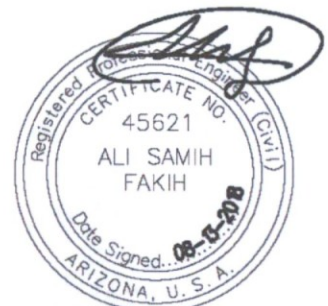
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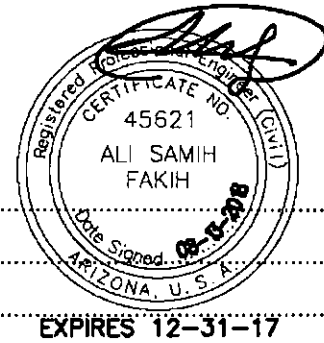
Submittal Date: June 15, 2018  
Revision Date: August 13, 2018



**EXPIRES 12-31-17**

Case No.: 391-PA-2018; 13-ZN-2018

Plan Check No.: TBD



## Table of Contents

1. INTRODUCTION .....	4
2. LOCATION AND PROJECT DESCRIPTION .....	4
2.1 LOCATION: .....	4
2.2 EXISTING AND PROPOSED DEVELOPMENTS SURROUNDING THE SITE: .....	4
2.3 EXISTING SITE DESCRIPTION: .....	4
2.4 PROPOSED SITE DEVELOPMENT: .....	5
2.5 FLOOD HAZARD ZONE: .....	5
3. EXISTING DRAINAGE CONDITIONS .....	5
3.1 DRAINAGE PATTERNS .....	5
3.2 ON-SITE RETENTION .....	5
3.3 EXISTING STORM SEWER SYSTEMS .....	6
4. PROPOSED STORM WATER MANAGEMENT .....	6
4.1 DESIGN INTENT: .....	6
4.2 DESIGN STORM REQUIREMENTS: .....	7
4.3 LAND CHARACTERISTICS .....	7
4.4 STORMWATER RETENTION: .....	8
4.5 PIPE CAPACITY AND INLET CALCULATIONS: .....	10
4.6 OFF-SITE FLOW IMPACTS AND STREET CAPACITY CALCULATIONS .....	10
4.7 ADEQ WATER QUALITY REQUIREMENTS .....	10
5. FLOOD SAFETY FOR DWELLINGS .....	10
5.1 FINISHED FLOOR ELEVATIONS .....	10
6. CONCLUSIONS .....	10
6.1 OVERALL PROJECT: .....	10
6.2 PROJECT PHASING: .....	10
7. WARNING AND DISCLAIMER OF LIABILITY .....	11
8. REFERENCES .....	11



**MUSEUM SQUARE - 13-ZN-2018**  
City of Scottsdale 1st Review Comments & Response  
8.13.18

CATEGORY	COMMENT	RESPONSE
<b>Zoning Ordinance and Scottsdale Revise Code Significant Issues</b>	The following code and ordinance related issues have been identified in the first review of this application, and shall be addressed in the resubmittal of the revised application material. Addressing these items is critical to scheduling the application for public hearing, and may affect the City Staff's recommendation. Please address the following:	Comments addressed / responses below
<b>Zoning:</b>		
1	Please provide a revised development plan addressing the items identified in the attached redlined development plan, in accordance with Zoning Ordinance Section 7.820. and the Plan & Report Requirements for Development Applications.	Comments addressed
2	In accordance with Zoning Ordinance Section 6.1310.D.1., an application for a Planned Block Development (PBD) with bonuses requires a development agreement. Although discussion and review of an associated development agreement has commenced, a formal application submittal for the development agreement must be provided. Please provide a complete application submittal for a Development Agreement application, in accordance with the provided Development Application Submittal Checklist, prior to or concurrent with the resubmittal of the Zoning District Map Amendment application.	The Development Agreement has been drafted and is currently under review and negotiation with the developer and the City Attorneys office.
3	The submitted Zoning District Map Amendment includes a parking master plan with a request for a parking reduction of approximately 30% for the hotel use. The proposal also includes multiple residential buildings totaling approximately 300 units. Historically, the city has experienced parking supply issues related to lack of guest parking for multi-family residential uses. In addition, it appears there will be a reduction in available on-street/public parking associated with the development. In accordance with Zoning Ordinance Section 9.104.F.5.h., a parking study will be required regarding the adequacy of future parking in the Loloma area. Please coordinate the details of what should be included in this study with Transportation Director, Paul Basha.	J2 Engineering & Design has coordinated with Paul Basha and a revised Parking Master Plan with the resubmittal.
4	Previous development cases 2-ZN-2000, 2-ZN-2000#3, and 2-ZN-2000#4, which are currently applicable to the subject property, include approved development standards for the site. This proposed development includes a 'Summary of proposed property development standards' which are different from the approved development standards for the site. Please provide a table that shows the current development standards compared to the proposed amended development standards.	A draft Comparison Matrix has been provide to City Staff and is included with the resubmittal.
5	In the Zoning Setbacks section of the development plan, please provide comparative illustrations and information, including dimensions and exceptions, regarding the current setback development standards and the proposed setback development standards.	In the 8.1.18 meeting with City Staff, all parties agreed that the standards proposed are identical to the existing setback standards and no additional information is required. Exhibit base map updated.
6	In the Building Stepbacks section of the development plan, please provide comparative illustrations and information, including dimensions and exceptions, regarding the current stepback development standards and the proposed setback development standards.	In the 8.1.18 meeting with City Staff, all parties agreed to show "existing" Loloma PBD stepback conditions on the building stepback exhibits. Exhibits updated. See "Attachment B" Building 3 stepback view as requested by redline comment on page 104. Additional dimension request on redline page 104 added where applicable. Encroachment exceptions excluded per Amended Standards Section E.
7	Please submit three (3) copies of the revised TIMA in response to the comments issued by the Transportation Department.	Revised TIMA Report is provided with the resubmittal
8	Please submit three (3) copies of the revised Parking Master Plan in response to the comments issued by the Transportation Department.	Revised PMP is provided with the resubmittal



General Plan / Old Town Character Area Plan

9	The PBD District Text Amendment (1-TA-2018) recently approved by City Council includes discussion regarding maximum site coverage related to bonus height (Sec. 7.1200.D.1.b.ii). Although this proposal does not appear to exceed site coverage standards, with a resubmittal please provide detail calculating such within the "Bonus Provisions/Special Improvement Calculations" discussion (page 7 of the development plan).	Maximum site coverage calculation has been added to the bonus provision discussion on page 7 of the Development Plan
10	The applicant is proposing to utilize the draft Old Town Character Area Plan (1-GP-2018) as a means to justify this proposal. To ensure continuity with the narrative as well as transparency with the community, please update the following maps depicted in the first submittal:	Comments addressed
	a. Page 45 depicts the 2009 Downtown Plan Land Use map. With a resubmittal, please replace with the proposed Old Town Future Land Use map (Map 2 in the recently approved plan)	Exhibit updated
	b. Page 49 depicts the 2009 Downtown Plan Development Types map. With a resubmittal, please replace with the recently approved Downtown Development Types map (Map 4 in the draft plan)	Exhibit updated
11	The General Plan Land Use (Goal 5, Bullet 2), Economic Vitality (Goal 5, bullet 6), Neighborhoods (Goal 4, bullet 7) and Community Mobility (Goal 11, Bullet 10) Elements encourage pedestrian oriented development. Additionally, the Old Town Character Area Plan addresses the importance of the pedestrian environment (Policies CD1.5, CD6.2, CD 6.3, and Goal M2). With a resubmittal please address the following:	The Development Plan has been updated to include the goals and policies noted
	a. A future signalized intersection is noted in the first submittal at 2nd Street and Goldwater as well as a future HAWK crossing traversing Goldwater. The narrative does not specify if these improvements will be provided by the applicant. With a resubmittal, please provide clear narrative that discusses these future crossings and how they will be realized.	Additional narrative language has been added regarding the signal and hawk crossing. The developer will continue to work with the City on these improvements.
	b. Page 112 of the first submittal notes the Goldwater/Marshall intersection as a Pedestrian Gateway. Crossing for this location will be accomplished via the future HAWK crossing located west of this intersection. However, Marshall Way has long been envisioned as a north/south pedestrian corridor through the downtown area – and likely, pedestrians will be drawn to this location (Goldwater/Marshall intersection). Please provide pedestrian wayfinding signage at this location to encourage pedestrians to cross at the HAWK location.	Additional narrative language has been added regarding additional wayfinding signage to hawk
	c. Pages 96 and 97 of the first submittal describe the potential for "Museum Way" as a future potential pedestrian connectivity opportunity and improvement on what is existing today between the subject site and Civic Center along 2nd Street. With a resubmittal, please provide further dialogue as to how the applicant will be participating in these proposed improvements.	Additional narrative added to address the applicant's participation
12	Both the General Plan (Character & Design Element Goal 5 and Growth Areas Element Goal 6) and the Old Town Character Area Plan (Character & Design Policies CD 5.5, CD 6.3 and CD 9.4; Mobility Policy M 1.3; and the Arts & Culture Chapter) discuss the importance of art within the downtown that is accessible and integrated into the urban form. Although the first submittal discusses integrated Public Art onsite – the locations are noted across the various site plans provided, but not in one singular graphic. With a resubmittal, provide location details on a Public Art Plan – public art should be viewable from the right-of-way and in locations that are publicly accessible.	Public Art Plan exhibit prepared & included
13	The Old Town Character Area Plan discusses open space areas as an important network of gathering places to be enjoyed by all (Character and Design Chapter Goal CD 5) Although Page 175 of the first submittal notes types of open spaces provided by this proposal in terms of landscaping, it does not specify which areas are public and which areas are not. With a resubmittal, please provide an Open Space Plan that notes all open space areas and describes whether they are public, private, or quasi-public (similar to areas around the waterfront).	Open Space Plan exhibit prepared & included
14	The application states several times that 100,000 new hotel room nights per year will be provided as a result of this project. However, that includes keys resulting from the Canopy hotel proposed northeast of the subject site. Since Canopy is not a part of this proposal – and to be more transparent – please update the narrative to only include estimates that may result from this proposal only.	Narrative updated
15	In the Development Plan, Compatibility section, please revise the narrative so that it also includes an explanation on how the proposed zoning district map amendment will be consistent with the Scottsdale General Plan Character and Design Element: Goal 2 – Bullet 3; Goal 4 - Bullets 2, 7, 13, 15, and 16.	Comments addressed (bullet #14 was address vs. bullet #16)
16	In the Development Plan, Compatibility section, please revise the narrative so that it also includes an explanation on how the proposed zoning district map amendment will be consistent with the and the Downtown Scottsdale Character Area Plan, Character and Design Element: Goal CD 1 - Policies 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, and 1.8; Goal CD 2 - Policy 2.1; Goal CD 3 - Policy 3.4; Goal CD 4 - Policies 4.2, and 4.4; Goal CD 10-Policies 10.7, 10.8, and 10.9.	Comments addressed (CD 1.6, 1.7 and 1.8 do not exist in new Old Town Character Area Plan )



<b>Fire:</b>		
17	Please revise the site plan or provide a supplemental plan to clearly demonstrate a minimum 24' width for all drive aisles in accordance with Fire Ord. 4045, Section 503.2.1.	Fire Access Plan exhibit prepared & included
18	Please revise the site plan or provide a supplemental plan to clearly demonstrate commercial turning radii requirements for all driveways (25' inner, 49' outside, 55' bucket swing), in accordance with the Design Standards & Policies Manual, Section 2-1.802.B.5	Fire Access Plan exhibit prepared & included
<b>Drainage:</b>		
19	Please submit two (2) copies of the revised Drainage Report with the original red-lined copy of the report to me with the rest of the resubmittal material identified in Attachment A.	Revised Drainage Report provided with resubmittal
<b>Water and Waste Water:</b>		
20	Please submit three (3) copies of the revised Waste Water Design Report with the original red-lined copy of the report to me with the rest of the resubmittal material identified in Attachment A.	Revised Waste Water Design Report provided with resubmittal
<b>Utilities</b>		
21	In accordance with Scottsdale Revised Code 47-80, please revise the site plan to note undergrounding of existing overhead utility lines along and within the project boundaries. Several such facilities requiring undergrounding by exist along 2nd Street and within proposed condo parcel.	Site plan revised & noted
<b>Significant Policy Related Issues</b>		
<b>Site Design:</b>		
22	In accordance with the Design Standards & Policies Manual Section 2 -1.309, please revise the design of the refuse area design per the following comments:	Refuse Plan per consultation with Waste Management staff prepared & included
	a. Place the refuse compactor container and approach pad so that the refuse truck route to and from the public street has a minimum unobstructed vertical clearance of thirteen (13) feet six (6) inches (fourteen 14 feet is recommended), and unobstructed minimum vertical clearance above the concrete approach slab and refuse compactor container storage area concrete slab of twenty-five (25) feet.	Refuse Plan per consultation with Waste Management staff prepared & included
	b. Place the refuse compactor container in a location that does not require the bin to be maneuvered or relocated from the bin's storage location to be loaded on to the refuse truck.	Refuse Plan per consultation with Waste Management staff prepared & included
	c. Provide a refuse compactor container approach area that has a minimum width of fourteen (14) feet and length of sixty (60) feet in front of the container.	Refuse Plan per consultation with Waste Management staff prepared & included
	d. Demonstrate path of travel for refuse truck accommodates a minimum vehicle turning radius of 45', and vehicle length of 40'.	Refuse Plan per consultation with Waste Management staff prepared & included
23	e. State on site plan compactor capacity conversion equating to the city's required 1 enclosure for every 20 units with no recycling or 2 enclosures for every 30 units with recycling. Although recycling is not a requirement, it has been determined to be an amenity that city residents are looking for in this type of development.	Refuse Plan per consultation with Waste Management staff prepared & included
	Please provide additional illustrations and information, including dimensions and exceptions, regarding the proposed Transitional Plan, in accordance with the Design Standards & Policies Manual Section 2-3.100.G.	Plan revised & updated
24	Please provide Special Impacts Analyses regarding Tall Building Shadows and Tall Building Solar Reflectivity, in accordance with the Design Standards & Policies Manual Section 2 - 3.100.L.	Comments addressed & incorporated. Shading & Shadows Plan of proposed conditions provided. An exhibit comparing 'as of right' built conditions vs proposed is being prepared for future review.
<b>Building &amp; Elevations</b>		
25	Regarding the Museum Square Hotel and the Residences at Museum Square Elevations, several windows on the South side of the building appear to be unprotected from solar exposure, heat gain, and to minimize reflected heat. Please provide exterior shade devices for these windows and/or provide illustrations that demonstrate how proposed roof overhangs, canopies, and other exterior design elements provide shade for these windows. All shade devices should be designed so that the shade material has a density of 75%, or greater, in order to maximize the effectiveness of the shade devices. Please refer to Scottsdale Sensitive Design Principle 9 and the Scottsdale Commercial Design Guidelines. Please refer to the following internet link: <a href="http://www.scottsdaleaz.gov/design/Shading">http://www.scottsdaleaz.gov/design/Shading</a> .	High performance window glazing will be utilized to address any issues associated with visible light reflectivity, solar energy reflectance and/or solar heat gain by way of factory fluid applied coatings and films. In addition, other Architectural elements are incorporated in the designs; such as "blades" (extensions of floor and roof plates), balcony projections and recessed punched window openings.
26	Regarding the Residences at Museum Square Elevations, Building One, several windows on the South and West sides of the building appear to be unprotected from solar exposure, heat gain, and to minimize reflected heat. Please provide exterior shade devices for these windows and/or provide illustrations that demonstrate how proposed roof overhangs, canopies, and other exterior design elements provide shade for these windows. All shade devices should be designed so that the shade material has a density of 75%, or greater, in order to maximize the effectiveness of the shade devices. Please refer to Scottsdale Sensitive Design Principle 9 and the Scottsdale Commercial Design Guidelines. Please refer to the following internet link: <a href="http://www.scottsdaleaz.gov/design/Shading">http://www.scottsdaleaz.gov/design/Shading</a> .	High performance window glazing will be utilized to address any issues associated with visible light reflectivity, solar energy reflectance and/or solar heat gain by way of factory fluid applied coatings and films. In addition, other Architectural elements are incorporated in the designs; such as "blades" (extensions of floor and roof plates), balcony projections and recessed punched window openings.
27	Regarding the Residences at Museum Square Elevations, Building Two, several windows on the East and West sides of the building appear to be unprotected from solar exposure, heat gain, and to minimize reflected heat. Please provide exterior shade devices for these windows and/or provide illustrations that demonstrate how proposed roof overhangs, canopies, and other exterior design elements provide shade for these windows. All shade devices should be designed so that the shade material has a density of 75%, or greater, in order to maximize the effectiveness of the shade devices. Please refer to Scottsdale Sensitive Design Principle 9 and the Scottsdale Commercial Design Guidelines. Please refer to the following internet link: <a href="http://www.scottsdaleaz.gov/design/Shading">http://www.scottsdaleaz.gov/design/Shading</a> .	High performance window glazing will be utilized to address any issues associated with visible light reflectivity, solar energy reflectance and/or solar heat gain by way of factory fluid applied coatings and films. In addition, other Architectural elements are incorporated in the designs; such as "blades" (extensions of floor and roof plates), balcony projections and recessed punched window openings.



<b>Circulation:</b>		
28	Please note: A minimum 24-foot wide cross access easement will need to be dedicated over the shared Main Art School Entry drive to allow access to the Scottsdale Artist School property, in accordance with the Design Standards & Policies Manual Section 5 - 3.201.	Comments noted - to be addressed at future plat stages
29	Please note: A minimum 24-foot wide cross access easement will need to be obtained over the shared hotel and Stage Brush Theater driveway to allow shared access to the theater and hotel parcel, in accordance with the Design Standards & Policies Manual Section 5 - 3.201.	Comments noted - to be addressed at future plat stages
30	Please revise the site plan to show widening of the sidewalk along Goldwater Boulevard to be a minimum width of 8 feet, in accordance with the Design Standards & Policies Manual Section 5 - 3.110. Dedication of a non-motorized public access easement will be required over any portions of the sidewalk that extend out of the right-of-way.	All walkway widths identified on the Pedestrian Circulation exhibit. 8' walk along Goldwater Blvd. incorporated.
31	Please revise the site plan to show all driveways consistent with COS Type CL -1 Standard Detail #2256.	Comments noted. Design to be refined & shown in more detail throughout the development process.
32	Please revise the site plan to show the existing street cross section for 2 <sup>nd</sup> Street along the site frontage to remain existing with parallel parking along both sides of the street with bike lanes.	Plan revised
33	Please submit a pedestrian circulation plan that identifies sidewalk locations and widths. Sidewalk shall be provided to connect all site building main entrances to the adjacent street sidewalk, with a minimum width of 6 feet, and a minimum width of 8 feet in higher activity areas, in accordance with the Design Standards & Policies Manual Section 5-3.110.	All walkway widths identified on the Pedestrian Circulation Plan.

#### Technical Corrections

##### Site:

34	In accordance with Scottsdale Revised Code 48-3 and 48-4, please revise the site plan or provide a supplemental document which identifies the proposed parcel boundaries. Prior to permit issuance, platting will be required for new parcel creation and easements will be required for any public infrastructure running through private parcels. Condo termination will be required to be recorded and provided to city as part of re-plat for the portions that have existing condominium regimes.	Noted - to be addressed at future plat & plan review stages
35	In the Development Plan, the photo on the page that is facing page 1 appears to be mislabeled. The view is looking east from the intersection of Goldwater Boulevard and the 1st Street alignment. Please revise accordingly.	Comments addressed & incorporated
36	In the Master Plan section, Cultural Connectivity & Museum Way, please identify the Stagebrush Theater and Scottsdale Artists' School on this map. These are cultural institutions that are important locally and the regionally, and they reinforce the concept of 'Museum Way'.	Comments addressed & incorporated
37	Regarding the Key Site Cross Sections, please extend the section lines so that several buildings of the adjacent existing developments will be illustrated for transitional comparative purposes in accordance with the Design Standards & Policies Manual Section 2 - 3.100.G.	Comments addressed & incorporated. Exhibits revised
38	Regarding the 'Open Space Scale' exhibit and 'Comparison' comments, these are a good technique to explain the concept, however the area that is outlined within the Scottsdale Civic Center Mall is not a good comparative area because of the structures and other features that are not usable by pedestrians. The example of the "existing civic plaza Amphitheatre area" is not overlaid on either of the amphitheater areas that are located within Scottsdale Civic Center Mall. Please provide a better comparative exhibit that demonstrates meaningful open space for the proposed development that is compared to meaningful open space with Scottsdale Civic Center Mall. Please refer to Zoning Ordinance Article III.	Comments addressed & incorporated. Exhibits revised
39	The proposed development is near three properties, listed on the Scottsdale Historic Register, that are constructed of adobe brick structures. Specifically, El Adobe Apartments, Cavalliere's Blacksmith Shop, and Old Adobe Mission Church. In the past, construction of new developments in Old Town Scottsdale have resulted in ground vibrations that have caused damage to adobe structures. Please provide information regarding construction methods and techniques that will be utilized to minimize ground vibrations and potential damage to these adobe structures.	Comments addressed & attached as "Attachment C"

#### NOTES & Additions: (from 8.1.18 staff meeting)

Non motorized vehicle access easement at back of building 2 w/ 8' min. walkway. (plan currently shows 10' walk)

Noted - to be addressed at future plat & development review

Check section at pinch point between hotel & theater.

Section is: Theater (with removed entry structure) > 10'6" to back of curb > 6" curb > 24' drive > 6" curb > 12' to hotel building.

Locate theater trash receptacle

Noted on refuse plan

Create Refuse Plan

Created & included

Add new line on pages 102-105 exhibits showing existing Loloma site PBD standards

Comments addressed & incorporated. Exhibits revised

Create new figure / ground exhibit comparing open space of existing plats and proposed Open Space

Exhibit prepared & included



## PROJECT TRACKING SHEET

5. As part of the preliminary drainage report in support of the development review application for this project, the applicant will need to evaluate and address maximum depth of street flow requirements in accordance with section 4-1.204 of the DSPM for public streets within and half streets adjacent to the development's site frontage.

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Stormwater Management  
City of Scottsdale  
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**2<sup>ND</sup> REVIEW COMPLETED BY RICH A. ON 9/5/18.**

Ready to be Determined? No ☐ Yes ☒

The revised conceptual drainage report and plan identify the need for roughly 29,000 cubic feet of storage within the residential parcel. The report and plan show, as a first option, the placement of this storage in an underground stormwater storage facility within the City owned artists school located east of the site. This option would require easement from the City and agreements between the City and developer for the storage and would constitute a significant encumbrance of the City's land. As alternatives to this, the report discusses storage within the parking structure and a waiver. The applicant need to be aware that the volume associated with the residential parcel may not be waived and that any storage within the residential parcel will need to meet all city requirements for stormwater storage including the dedications of a public drainage easement which would preclude the placement of the storage facilities with the parking garage. In short, in the event the required storage can not be placed in an area that is not within the residential parcel, the storage will need to remain within the residential parcel which may require modification to layout and design of the site which will likely include modifications to the underground parking to accommodate the stormwater storage. This issue will need to be resolved and part of the development review application for the project.

**3<sup>RD</sup> REVIEW COMPLETED BY ????? ON ??/??/??.**

Ready to be Determined? No ☐ Yes ☐

**ALL COMMENTS MUST INCLUDE THE ORDINANCE, POLICY, OR DSPM SECTION NUMBERS; PLEASE INITIAL AND DATE AT THE END OF EACH OF YOUR COMMENTS.**

**Ordinance Issues:**

37.

**Policy and Design Related Issues:**

38.

**Technical Corrections to be resolved prior the next application or final plans submittal:**

**LIST OF FIGURES:**

FIGURE 1	-	Vicinity Map
FIGURE 2	-	Aerial
FIGURE 3	-	FIRM
FIGURE 4	-	Parcel APN Exhibit
FIGURE 5	-	Proposed Development Plan

**APPENDIX:**

APPENDIX I	-	Rainfall Data
APPENDIX II	-	Calculations
APPENDIX III	-	Preliminary Grading Plan
APPENDIX IV	-	Drainage Report for Marshall Way

## 1. INTRODUCTION

This 50% level Preliminary Drainage Report represents the storm water analysis for the Zoning Case for the Museum Square mixed-use project proposed in Scottsdale, Arizona. The purpose of this report is to provide the hydrologic and hydraulic analyses, required by the City of Scottsdale, to support the proposed site plan for said development. This report includes discussions and calculations defining the storm water management concepts for the collection and conveyance necessary to comply with the drainage requirements of the City of Scottsdale and Maricopa County. Preparation of this report has been done in accordance with the requirements of the City of Scottsdale Design Standards & Policies Manual (DS&PM) 2018 <sup>1</sup>, and the Drainage Design Manuals for Maricopa County, Arizona, Volumes I<sup>2</sup> and Volume II

## 2. LOCATION AND PROJECT DESCRIPTION

### 2.1 LOCATION:

The subject property is generally located just south of Main Street's Gallery District, south of the Museum of the West (MOW) and the Scottsdale Artist's School.

- A portion of the Northeast quarter of Section 27, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona.
- Parcel ID -The project generally affects the following parcels:  
**Hotel:** North of 2<sup>nd</sup> Street and west of Marshall Way. Part of APNs 130-13-106, -108, and -109A  
**Apartment / Condos:** North of 2<sup>nd</sup> Street east of Marshall Way. APNs 130-13 -164A, -165A, -166A, and -169B  
**2<sup>nd</sup> Street ROW:** APNs 130-13-111 and -112 (from Goldwater Blvd to Marshall Way). Plus 121A and 131A  
**Marshall Way ROW:** APNs 130-13-107 and -117 (from Goldwater Blvd to an alley south of E Main Street).  
**Residential Buildings:** Courtyard at Main Street Plaza Scottsdale Condominium (MCR 973-06 and Loloma Partial Replat (MCR 823-22), and APN 130-12-172 an access drive.

Refer to **FIGURE 4** for additional parcel information.

Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets

### 2.2 EXISTING AND PROPOSED DEVELOPMENTS SURROUNDING THE SITE:

The site is bound as follows:

- West and South: N. Goldwater Boulevard
- North: Existing Residential (NW) and the Museum of the West (NE)
- East: Marshall Way
- Center: 2<sup>nd</sup> Street

### 2.3 EXISTING SITE DESCRIPTION:

The project area is fully developed as commercial.

- The proposed hotel parcel is approximately 1.09 acres.
- The proposed residential parcel is approximately 3.04 acres.



- The proposed apartment / condo parcel is approximately 0.91 acres (MCR)
- The project consists of additional areas yet to be described.

Refer to **FIGURE 2** attached for an aerial of the site.

#### **2.4 PROPOSED SITE DEVELOPMENT:**

Site development includes the demolition of the existing Loloma Station Transportation Center buildings and partial removal of the Stagebrush Theatre. New development includes the following:

- "The Arizonan" luxury hotel
- Apartment / Condo building
- Three residential buildings
- Underground parking
- Associated surface parking, landscaping, and amenities.
- Improvements to Marshall Way
- Improvements to 2<sup>nd</sup> Street

Refer to **FIGURE 5** for proposed development plan.

#### **2.5 FLOOD HAZARD ZONE:**

As defined by the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona, and Incorporated Areas, Community number 045012, Panel 2235 of 4425, as shown on Map Number 04013C2235L dated October 16, 2013, this site is designated as **Zone "X"**. As such, it is determined to be outside the 0.2% annual chance of floodplain. Refer to **FIGURE 3** for the FIRM map.

### **3. EXISTING DRAINAGE CONDITIONS**

#### **3.1 DRAINAGE PATTERNS:**

The referenced drainage report for Marshall Way indicates the drainage for the "blocks" generally goes from the northwest to the southeast, into the adjacent roadways, and is collected in catch basins or is conveyed within the road systems. Flows travel southerly in Marshall Way with portions of the runoff splitting at each crossing street and traveling to the east in the respective streets.

Preliminary Flow2D modeling indicates some portions of the roadways do not have capacity within the curb lines for the 100-YR event but the high-water elevations remain below building finish floor elevations. Refer to the referenced report in Appendix IV for additional information.

#### **3.2 ON-SITE RETENTION:**

**Apartment/Condominium Parcel:** No retention basins are existing on this site.

**Hotel Parcel:** No retention basins are existing on this site.

**Residential Buildings Parcel:** There are three stormwater storage facilities on the residential buildings site. Two basins discharge via dry-wells. Due to the proposed underground parking structure, these dry-wells will be removed. Existing retention volumes based on field topography compared to volumes stated in *Main Street Plaza Scottsdale*<sup>5</sup> report are summarized below:

EXISTING STORMWATER BASIN VOLUME SUMMARY		
BASIN ID	Volume from field topographic survey (c.f.)	*From Referenced Main Street Plaza Scottsdale Report (c.f.)
A	7,231	5,967
B	18,777	13,800
C	1,559	1,867
TOTAL	27,567	21,634

Refer to **Appendix II** for Existing Retention Exhibit and calculations.

Generally, runoff discharges to the Indian Bend Wash. The site drainage is described below. Runoff is calculated as follows:

$$Q_{100} = C_{wt}IA$$

Where:  $C_{wt}$  = The runoff coefficient relating runoff to rainfall

$I$  = Average rainfall intensity in inches/hour, lasting for  $T_c$  (use 7.48 in/hr per NOAA)

$T_c$  = The time of concentration (minutes) Use 5 minutes for developed area)

$A$  = The contributing drainage area in acres

### 3.3 EXISTING STORM SEWER SYSTEMS:

There is no apparent public underground storm system within the immediate area of the property on North Marshall Way, East 1<sup>st</sup> Street or the alley way on the north side of the property.

- There is a 24" storm drain lateral in Goldwater Boulevard that connects two existing curb opening catchbasins with 17-foot wings located at the curb returns in Marshall Way. This drainage system outfalls into the Indian Bend Wash.
- There are two 3-foot catchbasins with 17-foot wings located at the curb returns on 2<sup>nd</sup> Street west of Marshall Way. There is also a catch basin on Marshall Way at the northwest curb return with an 18" lateral. These basins discharge into a 72-inch diameter storm drain in 2<sup>nd</sup> Street.
  - **Proposed upgrades to 2<sup>nd</sup> Street will require the relocation / reconstruction of these catch basins.**
- Existing scuppers located along the west curb line of Marshall Way allow a small amount of runoff to drain into a Low Impact Design linear basin and bio swales in the MOW property.

## 4. PROPOSED STORM WATER MANAGEMENT

### 4.1 DESIGN INTENT:

On-site drainage may be handled within paved areas, through curb openings, underground storm systems, or onsite channels where necessary. Retention will be provided as defined by Section 4.2 below.

Any designed retention will be provided as allowed by site configuration within open spaces and have total discharge of the storm water within thirty-six hours. The ultimate outfall(s) remain the historical outlets.

Refer to Section 5 below for a discussion on proposed finished floor elevations.

#### 4.2 DESIGN STORM REQUIREMENTS:

The storm water system will be designed in accordance with City of Scottsdale Design Standards and Policies Manual. This is a re-development of existing commercial land; therefore, the City of Scottsdale allows that on-site retention shall be provided to store the difference between the existing vs. proposed development runoff from the 100-year 2-hour storm event while, as a minimum, maintaining existing storage or providing first flush storage, whichever is greater.

#### 4.3 LAND CHARACTERISTICS:

For this preliminary investigation, the entire area being impacted by development, including Marshall Way and 2<sup>nd</sup> Street, is being considered to define overall changes. Refer to the Cwt Exhibits for study boundary delineation. Based on Figure 4.1-4 of the DS&PM, runoff coefficients for the 100-year storm event used are as follows:

- C=0.95 for paved streets, parking lots and roof areas
- C=0.45 for undisturbed natural desert or desert landscape
- C=0.30 for grassed areas

**HYDROLOGIC ANALYSIS:** The hydrologic analysis is determined using the procedures in the City of Scottsdale Design Standards & Policies Manual and the Drainage Design Manual for Maricopa County, Arizona, Volume I. The Rational Method was utilized to compute the on-site peak discharges. The Rational Method equation is used as shown below:

$$Q = C_{wt}IA$$

Where:  $C_{wt}$  = The runoff coefficient relating runoff to rainfall  
 $I$  = Average rainfall intensity in inches/hour, lasting for  $T_c$   
 $T_c$  = The time of concentration (Using Five minutes for the developed areas)  
 $A$  = The contributing drainage area in acres

#### $C_{wt}$ CALCULATIONS:

##### ❖ RESIDENTIAL PARCEL (Three High-Rise buildings)

- Pre-development (Existing Conditions) (Refer to EXHIBIT "A" in Appendix II)
  - Landscape area (Desert): 1.23 ac @ C=0.45
  - Impervious areas (Roof / Pavement): 2.52 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **3.75 ac @  $C_{wt} = 0.79$**
- Post-development (Proposed Conditions) (Refer to EXHIBIT "B" in Appendix II)
  - Landscape area (Desert): 1.08 ac @ C=0.45
  - Impervious Areas (Roof / Pavement): 2.67 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **3.75 ac @  $C_{wt} = 0.81$**

##### ❖ HOTEL PARCEL (NWC Marshall Way & 2<sup>nd</sup> Street)



- Pre-development (Existing Conditions) (Refer to EXHIBIT "A" in Appendix II)
  - Landscape area (Desert): 0.64 ac @ C=0.45
  - Impervious areas (Roof / Pavement): 1.45 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **2.09 ac @  $C_{wt} = 0.80$**
- Post-development (Proposed Conditions) (Refer to EXHIBIT "B" in Appendix II)
  - Landscape area (Desert): 0.37 ac @ C=0.45
  - Impervious Ares (Roof / Pavement): 1.72 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **2.09 ac @  $C_{wt} = 0.86$**

#### ❖ APARTMENT/CONDO PARCEL (NEC Marshall Way & 2<sup>nd</sup> Street)

- Pre-development (Existing Conditions) (Refer to EXHIBIT "A" in Appendix II)
  - Landscape area (Desert): 0.08 ac @ C=0.45
  - Impervious areas (Roof / Pavement): 1.21 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **1.29 ac @  $C_{wt} = 0.92$**
- Post-development (Proposed Conditions) (Refer to EXHIBIT "B" in Appendix II)
  - Landscape area (Desert): 0.37 ac @ C=0.45
  - Impervious Ares (Roof / Pavement): 0.92 ac @ C=0.95
  - (Total area to street centerline)  $C_{wt}$ : **1.29 ac @  $C_{wt} = 0.81$**

#### RUNOFF RATE COMPARISON:

Based on a Tc of 5 minutes, existing condition and proposed development rates for the 100-yr storm event are calculated as follows:

##### ❖ RESIDENTIAL PARCEL (Three High-Rise buildings)

$$Q_{100} \text{ EXIST} = 0.79 * 7.44 \text{ in/hr} * 3.75 \text{ ac} = \mathbf{22.04 \text{ CFS}}$$

$$Q_{100} \text{ PROP} = 0.81 * 7.44 \text{ in/hr} * 3.75 \text{ ac} = \mathbf{25.60 \text{ CFS}}$$
 or a 16.2% increase.

##### ❖ HOTEL PARCEL (NWC Marshall Way & 2<sup>nd</sup> Street)

$$Q_{100} \text{ EXIST} = 0.80 * 7.44 \text{ in/hr} * 2.09 \text{ ac} = \mathbf{12.44 \text{ CFS}}$$

$$Q_{100} \text{ PROP} = 0.86 * 7.44 \text{ in/hr} * 2.09 \text{ ac} = \mathbf{13.37 \text{ CFS}}$$
 or a 7.5% increase.

##### ❖ APARTMENT/CONDO PARCEL (NEC Marshall Way & 2<sup>nd</sup> Street)

$$Q_{100} \text{ EXIST} = 0.92 * 7.44 \text{ in/hr} * 1.29 \text{ ac} = \mathbf{8.83 \text{ CFS}}$$

$$Q_{100} \text{ PROP} = 0.81 * 7.44 \text{ in/hr} * 1.29 \text{ ac} = \mathbf{7.77 \text{ CFS}}$$
 or a 12% decrease.

#### OVERALL COMPARISON:

$$\text{Existing} = 22.04 + 12.44 + 8.83 = \mathbf{43.31 \text{ cfs}}$$

$$\text{Proposed} = 25.60 + 13.37 + 7.77 = \mathbf{46.74 \text{ cfs}}$$
 or a 7.9% increase.

#### 4.4 STORMWATER RETENTION:

In accordance with COS requirements, existing retention volume plus volume required from Proposed vs Existing 100-yr, 2-hr event shall be stored or first flush, whichever is greater.

#### REQUIRED STORAGE Based on Existing vs Proposed conditions:

Stormwater storage for required First Flush treatment is calculated In accordance with the COS – DS&PM.

$$\text{Required Retention (Acre-Feet)} = (0.5''/12) * A * (C_{\text{prop}})$$

Stormwater storage for 100-yr, 2-hr event required is calculated In accordance with the COS – DS&PM.

$$\text{Required Retention (Acre-Feet)} = (P/12) * A * (C_{\text{prop}} - C_{\text{exist}})$$

Where: P = 100 Yr. 2 Hr. Precipitation in Inches (Ref: NOAA Atlas 14 in Appendix I)

A = Area (Acres)

C = C<sub>post</sub> – C<sub>pre</sub>

#### ❖ RESIDENTIAL PARCEL (Three High-Rise buildings)

- First Flush:  $(0.5''/12) * 3.75 \text{ ac} * (0.81) = 0.127 \text{ ac-ft}$  or 5,532 cf
- 100-yr, 2- hr:  $(2.16 \text{ in}/12) * 3.75 \text{ ac} * (0.81 - 0.79) = 0.014 \text{ ac-ft}$  or 610 cf.
- Existing storage: 27,567 cf per section 3.2 above
  - Required Storage: 27,567 cf + 610 cf = 28,177 cf

#### ❖ HOTEL PARCEL (NWC Marshall Way & 2<sup>nd</sup> Street)

- First Flush:  $(0.5''/12) * 2.09 \text{ ac} * (0.86) = 0.075 \text{ ac-ft}$  or 3,267 cf
- 100-yr, 2- hr:  $(2.16 \text{ in}/12) * 2.09 \text{ ac} * (0.91 - 0.80) = 0.042 \text{ ac-ft}$  or 1,830 cf
- Existing storage: None
  - Required Storage: FF = 3,267 cf.

#### ❖ APARTMENT/CONDO PARCEL (NEC Marshall Way & 2<sup>nd</sup> Street)

- First Flush:  $(0.5''/12) * 1.29 * (0.81) = 0.044 \text{ ac-ft}$  or 1,917 cf
- 100-yr, 2- hr:  $(2.16 \text{ in}/12) * 1.29 \text{ ac} * (0.81 - 0.92) = -0.026 \text{ ac-ft}$  or -1,133 cf (no increase)
- Existing storage: None
  - Required Storage: FF = 1,917 cf.

#### STORAGE PROVIDED:

- The volume for open basins is calculated using the area – sum volume method based on design contours
- Storage volume of underground piping is calculated using  $V = \pi r^2 L$ .

#### ❖ RESIDENTIAL PARCEL (Three High-Rise buildings)

Due to the restriction of open basins with percolation discharge caused by the proposed underground parking three options are being looked at to comply with COS requirements as follows:

1. Retention may be located on the adjacent school property with appropriate easements in place. Storage is anticipated to be underground.
  - 370 LF 10' Dia CMP @ 78.54 cf/ft = 29,069 cf > 28,177 cf required.
2. Alternative systems, such as concrete vaults within the parking structure and pump discharge, etc. may be pursued.

*Non Easement required*

3. A waiver may be requested if calculations prove the downstream conveyances can support increase flows. NO

❖ **HOTEL PARCEL (NWC Marshall Way & 2<sup>nd</sup> Street)**

3,637 cf provided > 3,267 cf required

❖ **APARTMENT/CONDO PARCEL (NEC Marshall Way & 2<sup>nd</sup> Street)**

2,004 cf provided > 1,917 cf required

Refer to **Appendix II** for retention volume calculations.

**STORMWATER DISCHARGE:**

Retention basins will be designed to be discharges within 36-hous.

- Open retention basins proposed for the overall development will be a maximum one (1) foot depth and, therefore, will be drained by percolation.
- Underground storage pipe will be discharged via dry wells.
- Vaults would be discharged via a pump to the existing storm system in Goldwater Ave.

**4.5 PIPE CAPACITY and INLET CALCULATIONS:**

These calculations will be provided in the Final Drainage Report

**4.6 OFF-SITE FLOW IMPACTS AND STREET CAPACITY CALCULATIONS**

These calculations, including modeling for splits in the road system, will be provided in the Preliminary Drainage Report in support of the Development Review application.

**4.7 ADEQ WATER QUALITY REQUIREMENTS**

If the limit of disturbance exceeds one (1) acre, a NOI will be submitted to ADEQ and an approved NOI Certification from ADEQ with an AZCON number will be provided to the City during Improvement Plans submittal.

## **5. FLOOD SAFETY FOR DWELLINGS**

**5.1 FINISHED FLOOR ELEVATIONS**

The building finished floor elevations (FFE) are protected from flooding as follows:

- The FFE will be set a minimum of 14 inches above emergency overflow points. The ultimate outflow(s) for this project will maintain historical outfall location.
- The FFE will be set a minimum of 12 inches above the 100-year high-water elevation of any adjacent streets, retention basins and drainage paths.

This will ensure that each building will be well above the 100-year water level.

## **6. CONCLUSIONS**

**6.1 OVERALL PROJECT:**

1. The buildings FFE is set at an elevation a minimum of 12" above the adjacent HWE and 14" above the ultimate outfall elevation.
2. Proposed retention basins will drain within 36-hours

**6.2 PROJECT PHASING:**

Phasing to be determined



## 7. WARNING AND DISCLAIMER OF LIABILITY

RE: following page.

## 8. REFERENCES

1. *Design Standards & Policies Manual, City of Scottsdale – 2018*
2. *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology, Flood Control District of Maricopa County, Fourth Edition, August 15, 2013*
3. *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics, Flood Control District of Maricopa County, August 15, 2013*
4. *Drainage Report – Marshall Way Goldwater Blvd to Indian School Road prepared by Dibble Engineering dated August 8, 2017 (Project No.: TD01/1015013.02)*
5. *Drainage Master Plan Update for Main Street Plaza Scottsdale and Conceptual Drainage Report for Main Street Plaza Scottsdale Phases II and III, prepared by Gannett Fleming, Inc., dated June 29, 2005*



## WARNING & DISCLAIMER OF LIABILITY

The Drainage and Floodplain Regulations and Ordinances of the City of Scottsdale are intended to "minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding caused by the surface runoff of rainfall" (Scottsdale Revised Code §37-16).

As defined in S.R.C. §37-17, a flood plain or "*Special flood hazard* area means an area having flood and/or flood related erosion hazards as shown on a FHBM or FIRM as zone A, AO, A1-30, AE, A99, AH, or E, and those areas identified as such by the floodplain administrator, delineated in accordance with subsection 37-18(b) and adopted by the floodplain board." It is possible that a property could be inundated by greater frequency flood events or by a flood greater in magnitude than a 100-year flood. Additionally, much of the Scottsdale area is a dynamic flood area; that is, the floodplains may shift from one location to another, over time, due to natural processes.

### **WARNING AND DISCLAIMER OF LIABILITY PURSUANT TO S.R.C §37-22**

"The degree of flood protection provided by the requirements in this article is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by man-made or natural causes. This article (Chapter 37, Article II) shall not create liability on the part of the city, any officer or employee thereof, or the federal government for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder."

Compliance with Drainage and Floodplain Regulations and Ordinances does not insure complete protection from flooding. The Floodplain Regulations and Ordinances meet established local and federal standards for floodplain management, but neither this review nor the Regulations and Ordinances take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions, all of which may have an adverse affect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

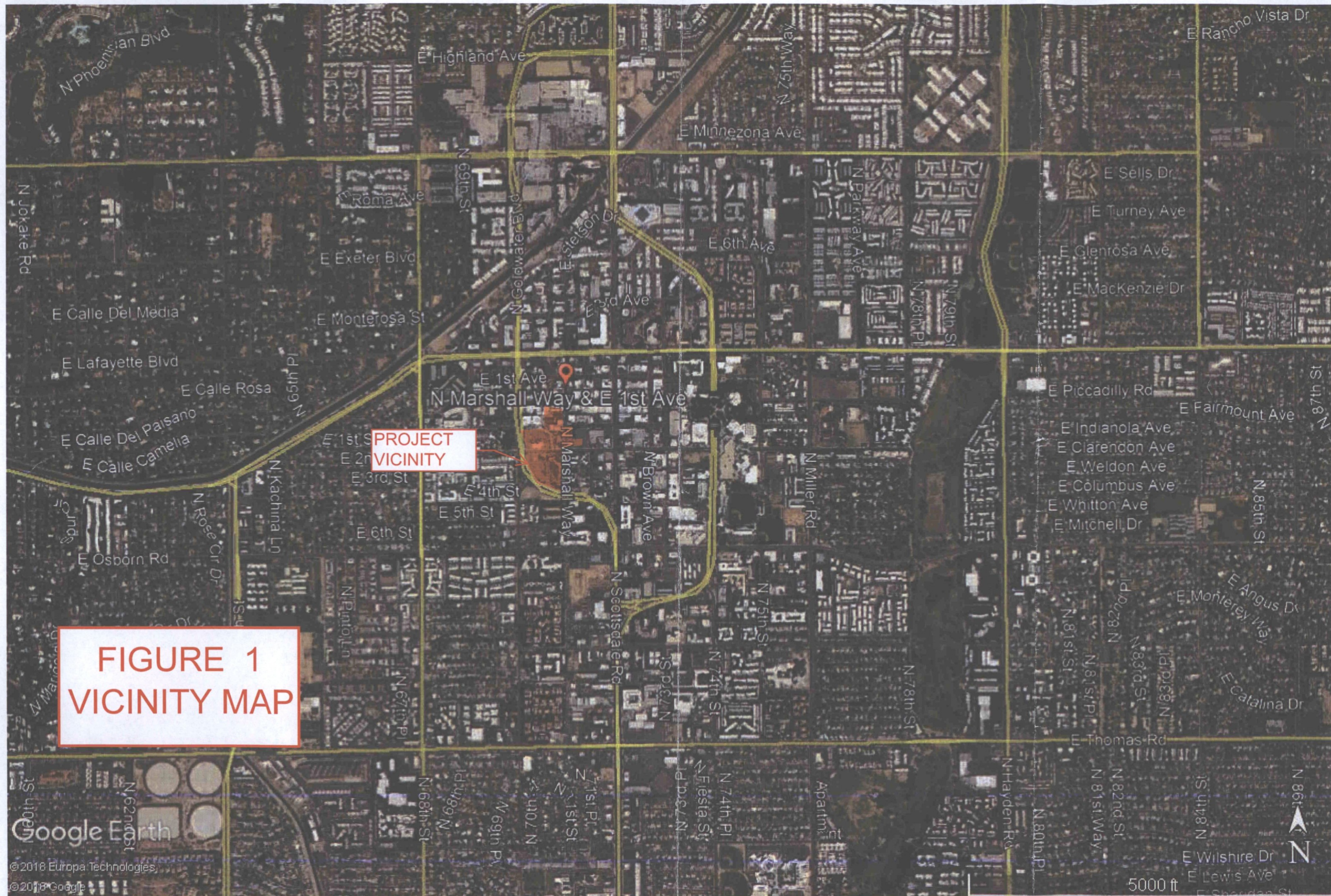
I have read and understand the above. If I am an agent for an owner I have made the owner aware of and explained this disclaimer.

\_\_\_\_\_  
Plan Check No.

\_\_\_\_\_  
Owner or Agent

\_\_\_\_\_  
Date





**FIGURE 1**  
**VICINITY MAP**





FIGURE 2  
AERIAL

Google Earth

© 2018 Europa Technologies

© 2018 Google



## NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Arizona State Plane Central zone (FIPSZONE 5002). The horizontal datum was NAD 83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Map users wishing to obtain flood elevations referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29) may use the following Maricopa County website application: <http://www.fcd.maricopa.gov/Maps/igsmaps/apps/igsmaps/application/index.cfm>

This web tool allows users to obtain point-specific datum conversion values by zooming in and hovering over a VERTCON checkbox on the layers menu on the left side of the screen. The VERTCON grid referenced in this web application was also used to convert existing flood elevations from NGVD 29 to NAVD 88.

To obtain current elevation, description, and/or location information for National Geodetic Survey bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>. To obtain information about Geodetic Data and/or Survey Bench Marks produced by the Maricopa County Department of Transportation, please visit the Flood Control District of Maricopa County website at: <http://www.fcd.maricopa.gov/Maps/igsmaps/apps/igsmaps/application/index.cfm>

**Base map information** shown on this FIRM was derived from multiple sources. Aerial imagery was provided in digital format by the Maricopa County Department of Public Works, Flood Control District. The imagery is dated October 2009 to November 2009. Additional National Aerial Imagery Program (NAIP) imagery was provided by the Arizona State Land Department (ALRIS) and is dated 2007. The coordinate system used for the production of the digital FIRM is State Plane Arizona Central NAD83 HARN, International Feet.

The profile baseline depicted on this map represents the hydraulic modeling baseline that match flood profiles in the FIS report. As a result of improved topographic data, the profile baseline, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

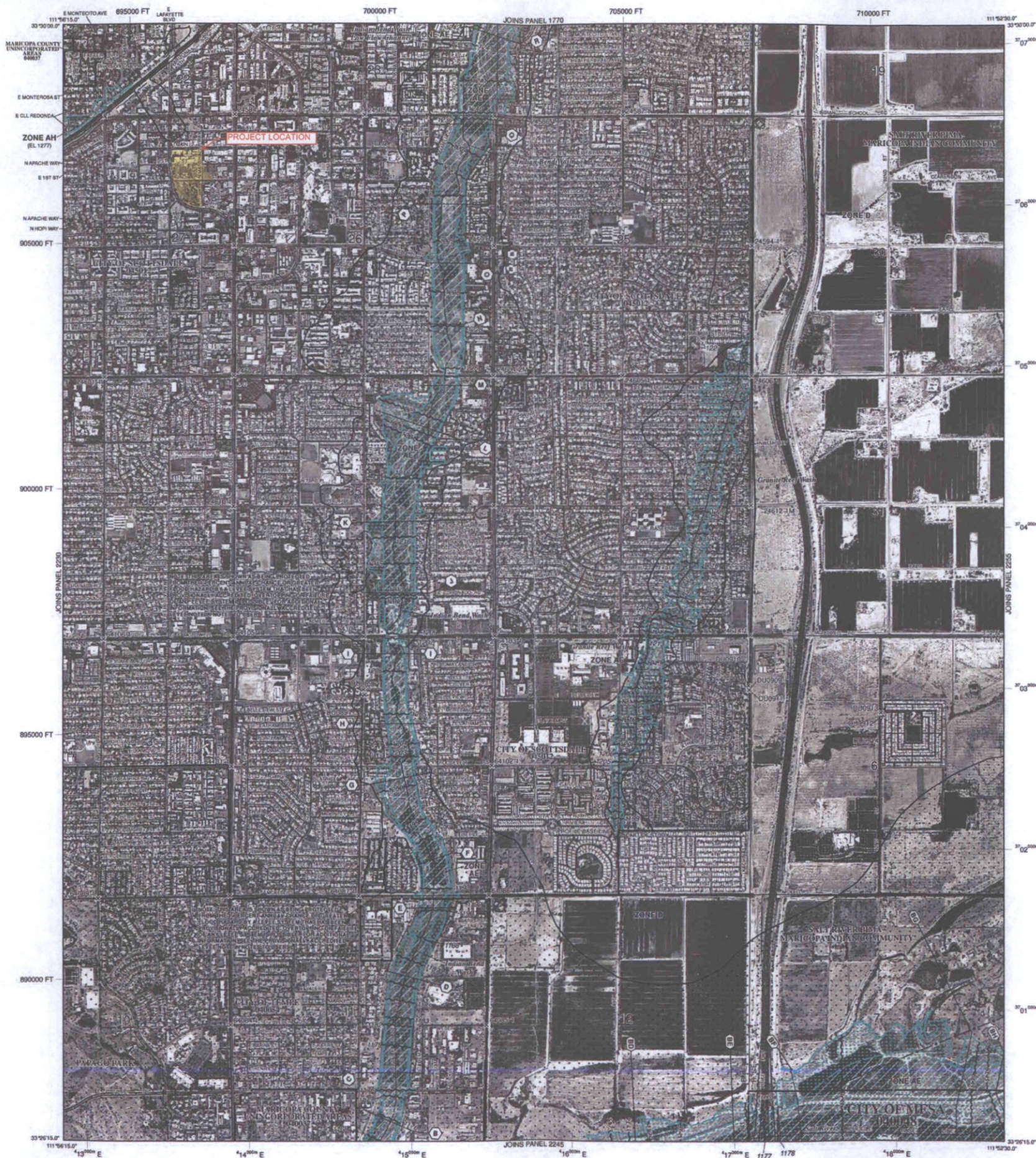
**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM, visit the Map Service Center (MSC) website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

If you have questions about this map, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.

**Provisionally Accredited Levee Notes to Users:** Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by June 25, 2011. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <http://www.fema.gov/business/nfip/index.htm>.



## LEGEND

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, AV, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A**  
No Base Flood Elevations determined.
- ZONE AE**  
Base Flood Elevations determined.
- ZONE AH**  
Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO**  
Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of shallow fan flooding, velocities also determined.
- ZONE AR**  
Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AV**  
Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE VE**  
Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

**ZONE X**  
Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

**ZONE X**  
Areas determined to be outside the 0.2% annual chance floodplain.

**ZONE D**  
Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet\*
- Base Flood Elevation value where uniform within zone; elevation in feet\*

\* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

**Cross section line**

**Traverse line**

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1985-meter Universal Transverse Mercator grid ticks, zone 12

5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 5002), Transverse Mercator

**DXS510**  
Bench mark (see explanation in Notes to Users section of this FIS panel)

**M1.5**  
River Mile

**MAP REPOSITORIES**  
Refer to Map Repositories list on Map Index

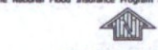
**EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**  
April 15, 1988

**EFFECTIVE DATES OF REVISIONS TO THIS PANEL**  
July 13, 2001 September 20, 2005

October 16, 2013 - In advance of the 2013 flood insurance rate map update, to change floodway, to change corporate limits, to add flood and land names, to incorporate previously revised letters of map revision, to add base flood elevation, and to add special flood hazard areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-438-6628.



**MAP SCALE 1" = 1000'**

0 500 1000 2000 FEET

0 500 1000 2000 METERS

**NFIP**

**PANEL 2235L**

**FIRM**

**FLOOD INSURANCE RATE MAP**

**MARICOPA COUNTY,**

**ARIZONA**

**AND INCORPORATED AREAS**

**PANEL 2235 OF 4425**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

**COMMUNITY**

**NUMBER**

**PANEL**

**SUFFIX**

MARICOPA COUNTY 040037 2235 L

MEHA, CITY OF 040048 2235 L

SCOTTSDALE, CITY OF 040052 2235 L

TEMPE, CITY OF 040054 2235 L

**FIGURE 3**

Notice to User: The Map Number shown below should be used when purchasing map sheets. The Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
04013C2235L

**MAP REVISED**  
OCTOBER 16, 2013

Federal Emergency Management Agency



Map

FIGURE 4  
Parcel ID Exhibit

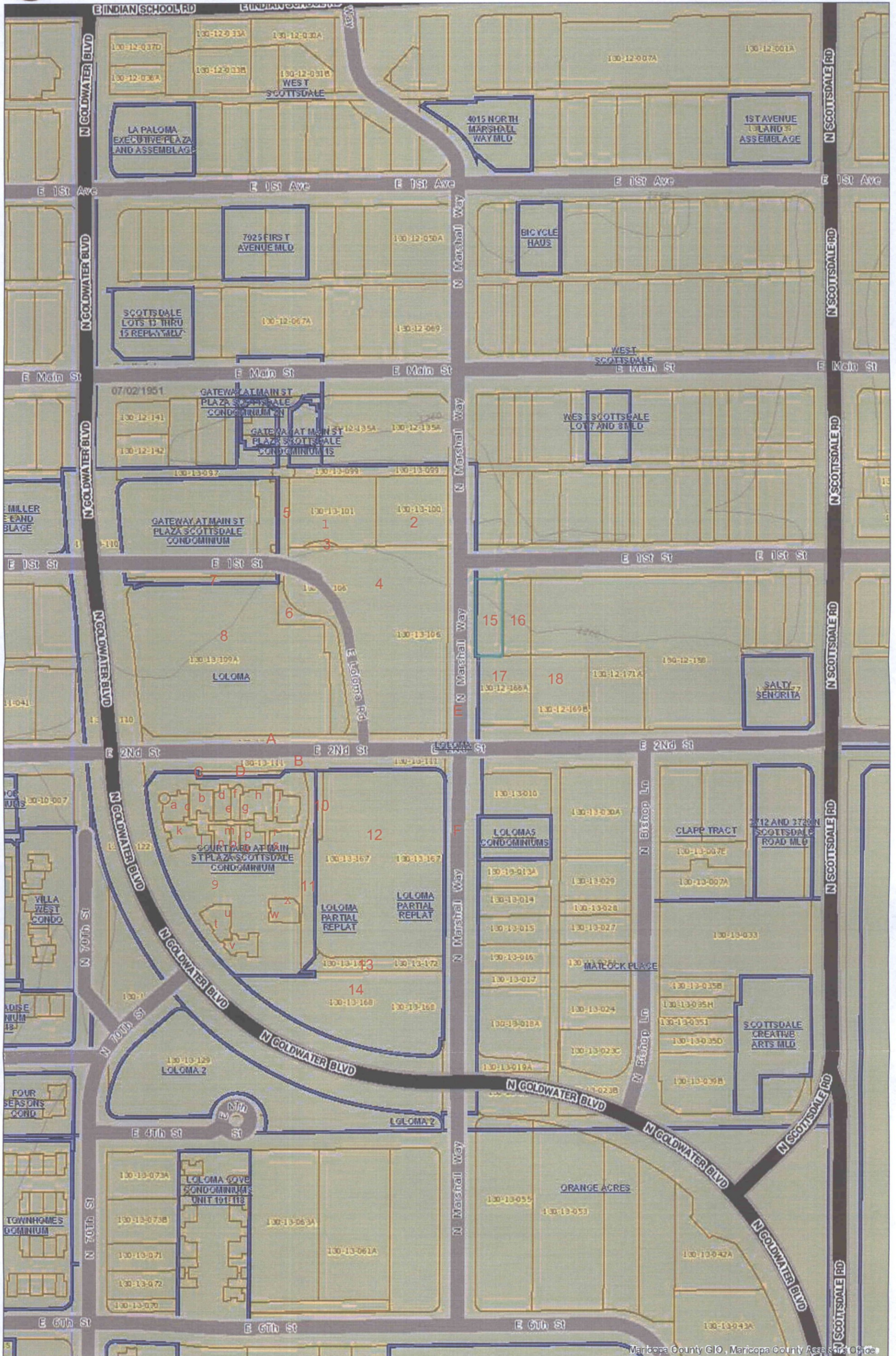




FIGURE 4  
Parcel ID Exhibit

LALOMA PARCEL EXHIBIT					
PARCEL No.	APN	SUB-APN	AREA (SF)	SUB AREA (SF)	OWNER
1	1	130-13-101	18,467		COS
2	2	130-13-100	15,552		COS
3	3	130-13-102	440		COS
4	4	130-13-106	73,082		COS
5	5	130-13-103	3,352		COS
6	6	130-13-108	7,585		COS
7	7	130-13-105A	3,365		COS
8	8	130-13-109A	85,511		COS
9	9	130-13-404	Tract CE	54,131	COS
10	9a	130-13-345		2,312	COS
11	9b	130-13-357		2,138	COS
12	9c	130-13-385		2,761	COS
13	9d	130-13-356		1,723	COS
14	9e	130-13-371		1,865	COS
15	9f	130-13-342		1,012	COS
16	9g	130-13-383		1,667	COS
17	9h	130-13-341		2,953	COS
18	9i	130-13-369		2,332	COS
19	9j	130-13-340		2,158	COS
20	9k	130-13-346		3,112	COS
21	9l	130-13-397		2,331	COS
22	9m	130-13-387		1,866	COS
23	9n	130-13-359		1,674	COS
24	9o	130-13-360		1,018	COS
25	9p	130-13-388		1,666	COS
26	9q	130-13-349		1,909	COS
27	9r	130-13-389		2,324	COS
28	9s	130-13-350		2,017	COS
29	9t	130-13-366		2,513	COS
30	9u	130-13-391		3,966	COS
31	9v	130-13-353		1,908	COS
32	9w	130-13-390		4,011	COS
33	9X	130-13-351		2,159	COS
34	9y	130-13-368		1,911	COS
35	10	130-13-171	1,543		COS
36	11	130-13-111	16,384		COS
37	12	130-13-167	73,489		COS
38	13	130-13-172	6,105		COS
39	14	130-13-168	38,428		COS
40	15	130-12-165A	6,750		ARC Scottsdale Holdings, LLP
41	16	130-12-164A	6,750		ARC Scottsdale Holdings, LLP
42	17	130-12-166A	12,136		ARC Scottsdale Holdings, LLP
43	18	130-12-169B	13,905		ARC Scottsdale Holdings, LLP
44	A	130-13-112	17,988		COS
45	B	130-13-111	16,384		COS
46	C	130-13-121A	69		COS
47	D	130-13-131A	1,437		COS
48	E	130-13-107	26,113		COS
49	F	130-13-117	38,638	TO S GW ROW	COS

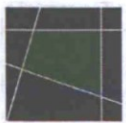


MAP KEY

- 1 RESIDENTIAL BUILDING #1  
- 11 STORIES  
- 135' HEIGHT
- 2 RESIDENTIAL BUILDING #2  
- 13 STORIES  
- 150' HEIGHT
- 3 RESIDENTIAL BUILDING #3  
- 13 STORIES  
- 150' HEIGHT
- 4 HOTEL - THE ARIZONAN  
- 13 STORIES  
- 150' HEIGHT  
- 190 KEYS
- 5 APARTMENT / CONDO BUILDING  
- TBD
- 6 SURFACE PARKING LOT  
- 120 SPACES
- 7 ADDITIONAL ON-STREET PARKING  
- UP TO 46 SPACES (W. of Marshall Way)
- 8 RESIDENTIAL PARCEL PURCHASE  
- 134,213 SQFT
- 9 NORTH / SOUTH DISTRICT PROMENADE
- 10 CONDOMINIUM PARKING TRAY  
- 376 SPACES
- 11 GARAGE PARKING ACCESS
- 12 PLAZA / DRIVE COURT
- 13 MUSEUM "BRIDGE" EXPANSION
- 14 POOL & TERRACE
- 15 OPEN SPACE / GARDENS
- 16 MUSEUM EXPANSION  
- 30,000 SQFT +/-
- 17 ADDITIONAL ON-STREET PARKING  
- UP TO 21 SPACES (north of 1st street)
- 18 PROPOSED HOTEL (HILTON CANOPY)  
- 66' HEIGHT  
- 185 KEYS
- 19 MULTI-USE PUBLIC SPACE  
- LAWN AREA, PATIOS, & TERRACES  
- PERFORMANCE SPACE  
- SPLASH PAD  
- SCULPTURE GARDEN
- 20 RECONFIGURED HOTEL PARCEL PURCHASE  
- (47,343 SQFT)
- 21 ADDITIONAL ON STREET PARKING  
- UP TO 28 SPACES (south of 1st street)
- 22 PEDESTRIAN CONNECTION
- 23 ADDITIONAL ON-STREET PARKING  
- UP TO 37 SPACES (East of Marshall Way)
- 24 HOTEL PARKING TRAY  
- UPPER LEVEL (84 SPACES)  
- LOWER LEVEL (84 SPACES)
- 25 COVERED PROMENADE
- 26 RECONFIGURED ENTRY DRIVE  
(SHARED ACCESS / EGRESS)
- 27 ADDITIONAL ON-STREET PARKING  
- UP TO 37 SPACES (South of 2nd Street)
- 28 MAIN ART SCHOOL SHARED  
DRIVE ENTRY
- 29 HOTEL GARAGE PARKING ACCESS
- 30 THE GOLDWATER (CONDOMINIUMS)
- 31 NEW SIGNALIZED CROSSWALK
- 32 NEW SIGNALIZED MID-BLOCK  
CROSSWALK (HAWK)



MUSEUMSQUARE



SCOTTSDALE'S MUSEUMSQUARE  
REZONING DEVELOPMENT APPLICATION

DRAFT

SWABACK  
Architects + Planners

23F. SITE PLAN  
6.12.18





*"LEED®ing and Developing Smart Projects"*

# *APPENDIX I*

## *Rainfall Data*



NOAA Atlas 14, Volume 1, Version 5  
Location name: Scottsdale, Arizona, USA\*  
Latitude: 33.4917°, Longitude: -111.929°  
Elevation: 1256.91 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.183 (0.154-0.223)	0.240 (0.202-0.292)	0.326 (0.273-0.395)	0.392 (0.326-0.473)	0.481 (0.393-0.578)	0.550 (0.444-0.658)	0.620 (0.492-0.740)	0.693 (0.539-0.825)	0.789 (0.598-0.941)	0.862 (0.641-1.03)
10-min	0.279 (0.234-0.340)	0.365 (0.307-0.444)	0.496 (0.415-0.602)	0.596 (0.496-0.720)	0.733 (0.599-0.880)	0.838 (0.676-1.00)	0.944 (0.748-1.13)	1.05 (0.821-1.26)	1.20 (0.910-1.43)	1.31 (0.976-1.57)
15-min	0.345 (0.290-0.421)	0.452 (0.381-0.550)	0.614 (0.514-0.746)	0.739 (0.614-0.893)	0.908 (0.742-1.09)	1.04 (0.838-1.24)	1.17 (0.927-1.40)	1.31 (1.02-1.56)	1.49 (1.13-1.78)	1.63 (1.21-1.95)
30-min	0.465 (0.390-0.567)	0.609 (0.513-0.741)	0.827 (0.692-1.00)	0.995 (0.827-1.20)	1.22 (0.999-1.47)	1.40 (1.13-1.67)	1.58 (1.25-1.88)	1.76 (1.37-2.10)	2.00 (1.52-2.39)	2.19 (1.63-2.62)
60-min	0.576 (0.483-0.702)	0.754 (0.635-0.917)	1.02 (0.857-1.24)	1.23 (1.02-1.49)	1.51 (1.24-1.82)	1.73 (1.40-2.07)	1.95 (1.55-2.33)	2.18 (1.70-2.60)	2.48 (1.88-2.96)	2.71 (2.02-3.24)
2-hr	0.667 (0.569-0.796)	0.864 (0.736-1.03)	1.16 (0.983-1.38)	1.38 (1.16-1.64)	1.69 (1.40-1.99)	1.92 (1.57-2.26)	2.16 (1.74-2.54)	2.41 (1.91-2.83)	2.74 (2.12-3.22)	2.99 (2.26-3.54)
3-hr	0.726 (0.615-0.873)	0.931 (0.793-1.13)	1.22 (1.04-1.47)	1.46 (1.22-1.74)	1.78 (1.47-2.12)	2.04 (1.66-2.42)	2.31 (1.85-2.74)	2.59 (2.04-3.07)	2.98 (2.28-3.53)	3.30 (2.46-3.91)
6-hr	0.874 (0.757-1.03)	1.11 (0.963-1.30)	1.42 (1.23-1.67)	1.67 (1.43-1.95)	2.01 (1.70-2.33)	2.28 (1.90-2.63)	2.56 (2.10-2.95)	2.84 (2.28-3.29)	3.23 (2.53-3.75)	3.54 (2.71-4.11)
12-hr	0.977 (0.855-1.14)	1.24 (1.08-1.44)	1.57 (1.36-1.81)	1.83 (1.58-2.11)	2.17 (1.86-2.50)	2.44 (2.07-2.81)	2.72 (2.27-3.13)	3.00 (2.47-3.45)	3.38 (2.71-3.91)	3.67 (2.89-4.27)
24-hr	1.17 (1.04-1.32)	1.48 (1.32-1.67)	1.92 (1.71-2.17)	2.27 (2.02-2.55)	2.75 (2.42-3.09)	3.13 (2.74-3.51)	3.53 (3.07-3.96)	3.94 (3.40-4.42)	4.51 (3.85-5.06)	4.96 (4.19-5.58)
2-day	1.26 (1.13-1.42)	1.61 (1.44-1.82)	2.12 (1.89-2.38)	2.52 (2.24-2.83)	3.08 (2.72-3.46)	3.53 (3.10-3.96)	4.00 (3.49-4.50)	4.50 (3.89-5.06)	5.19 (4.44-5.85)	5.74 (4.86-6.49)
3-day	1.33 (1.19-1.50)	1.71 (1.52-1.92)	2.25 (2.00-2.53)	2.68 (2.37-3.01)	3.29 (2.90-3.69)	3.78 (3.31-4.24)	4.30 (3.74-4.83)	4.85 (4.18-5.45)	5.62 (4.79-6.32)	6.24 (5.26-7.04)
4-day	1.41 (1.25-1.59)	1.80 (1.60-2.03)	2.37 (2.11-2.67)	2.84 (2.51-3.19)	3.50 (3.08-3.92)	4.03 (3.52-4.51)	4.60 (3.99-5.15)	5.20 (4.47-5.84)	6.05 (5.14-6.79)	6.74 (5.67-7.58)
7-day	1.56 (1.39-1.76)	1.99 (1.78-2.25)	2.63 (2.34-2.97)	3.15 (2.79-3.55)	3.88 (3.42-4.36)	4.47 (3.91-5.02)	5.10 (4.43-5.73)	5.76 (4.96-6.48)	6.70 (5.70-7.54)	7.46 (6.28-8.41)
10-day	1.70 (1.51-1.91)	2.17 (1.93-2.44)	2.86 (2.54-3.22)	3.42 (3.03-3.84)	4.21 (3.70-4.71)	4.83 (4.23-5.40)	5.50 (4.78-6.15)	6.20 (5.35-6.94)	7.18 (6.12-8.05)	7.97 (6.72-8.94)
20-day	2.08 (1.86-2.33)	2.68 (2.39-3.00)	3.54 (3.16-3.95)	4.19 (3.73-4.67)	5.07 (4.48-5.65)	5.74 (5.06-6.40)	6.42 (5.64-7.17)	7.12 (6.22-7.95)	8.05 (6.97-9.02)	8.77 (7.53-9.84)
30-day	2.43 (2.17-2.73)	3.13 (2.79-3.50)	4.13 (3.67-4.61)	4.88 (4.34-5.44)	5.90 (5.21-6.57)	6.68 (5.88-7.43)	7.48 (6.55-8.32)	8.29 (7.23-9.23)	9.39 (8.12-10.5)	10.2 (8.78-11.4)
45-day	2.82 (2.52-3.15)	3.63 (3.25-4.06)	4.78 (4.28-5.34)	5.64 (5.03-6.29)	6.76 (6.01-7.54)	7.61 (6.74-8.49)	8.46 (7.47-9.45)	9.32 (8.18-10.4)	10.4 (9.11-11.7)	11.3 (9.79-12.7)
60-day	3.12 (2.80-3.48)	4.03 (3.62-4.49)	5.30 (4.75-5.90)	6.22 (5.56-6.92)	7.42 (6.62-8.26)	8.31 (7.39-9.25)	9.20 (8.15-10.2)	10.1 (8.89-11.2)	11.2 (9.84-12.5)	12.1 (10.5-13.5)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

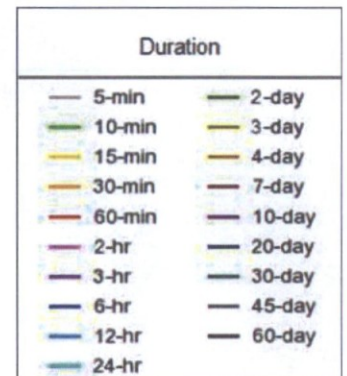
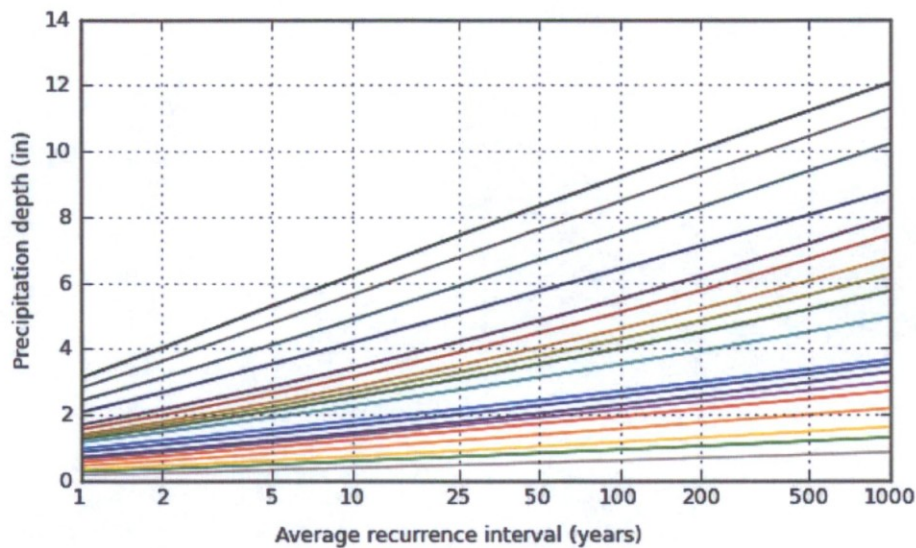
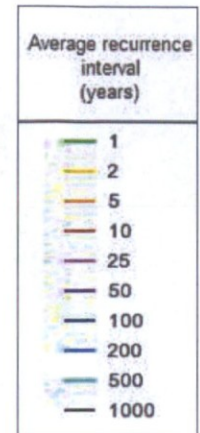
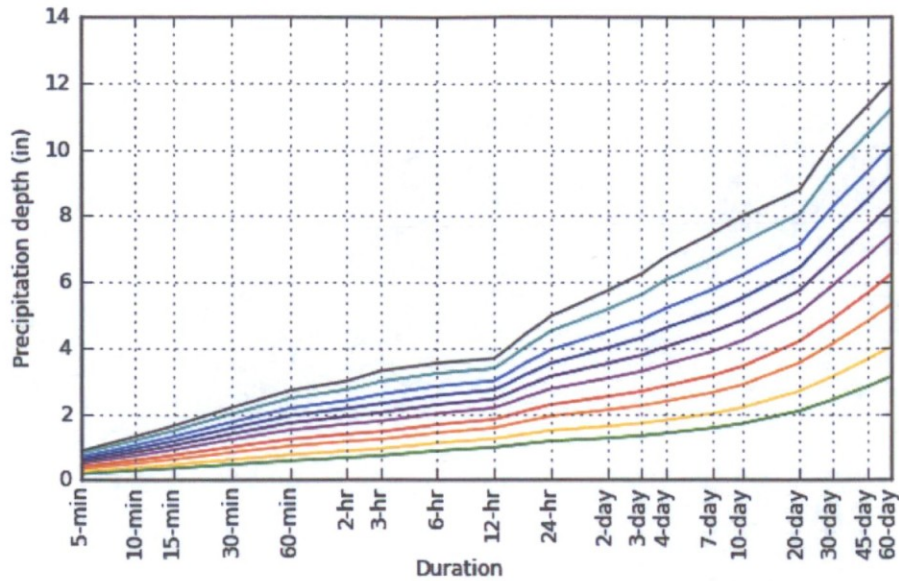
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)



## PF graphical

PDS-based depth-duration-frequency (DDF) curves  
Latitude: 33.4917°, Longitude: -111.9290°



## Maps & arials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial





NOAA Atlas 14, Volume 1, Version 5  
Location name: Scottsdale, Arizona, USA\*  
Latitude: 33.4917°, Longitude: -111.929°  
Elevation: 1256.91 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Helm, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

### PF tabular

#### PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)<sup>1</sup>

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	2.20 (1.85-2.68)	2.88 (2.42-3.50)	3.91 (3.28-4.74)	4.70 (3.91-5.68)	5.77 (4.72-6.94)	6.60 (5.33-7.90)	7.44 (5.90-8.88)	8.32 (6.47-9.90)	9.47 (7.18-11.3)	10.3 (7.69-12.4)
10-min	1.67 (1.40-2.04)	2.19 (1.84-2.66)	2.98 (2.49-3.61)	3.58 (2.98-4.32)	4.40 (3.59-5.28)	5.03 (4.06-6.01)	5.66 (4.49-6.76)	6.32 (4.93-7.54)	7.20 (5.46-8.59)	7.87 (5.86-9.41)
15-min	1.38 (1.16-1.68)	1.81 (1.52-2.20)	2.46 (2.06-2.98)	2.96 (2.46-3.57)	3.63 (2.97-4.36)	4.15 (3.35-4.97)	4.68 (3.71-5.59)	5.23 (4.07-6.23)	5.95 (4.52-7.10)	6.51 (4.84-7.78)
30-min	0.930 (0.780-1.13)	1.22 (1.03-1.48)	1.65 (1.38-2.01)	1.99 (1.65-2.40)	2.45 (2.00-2.94)	2.80 (2.26-3.34)	3.15 (2.50-3.76)	3.52 (2.74-4.19)	4.01 (3.04-4.78)	4.38 (3.26-5.24)
60-min	0.576 (0.483-0.702)	0.754 (0.635-0.917)	1.02 (0.857-1.24)	1.23 (1.02-1.49)	1.51 (1.24-1.82)	1.73 (1.40-2.07)	1.95 (1.55-2.33)	2.18 (1.70-2.60)	2.48 (1.88-2.96)	2.71 (2.02-3.24)
2-hr	0.334 (0.284-0.398)	0.432 (0.368-0.517)	0.578 (0.492-0.688)	0.690 (0.580-0.820)	0.843 (0.700-0.994)	0.960 (0.786-1.13)	1.08 (0.872-1.27)	1.20 (0.953-1.41)	1.37 (1.06-1.61)	1.50 (1.13-1.77)
3-hr	0.242 (0.205-0.291)	0.310 (0.264-0.375)	0.408 (0.345-0.490)	0.485 (0.407-0.580)	0.593 (0.491-0.705)	0.679 (0.554-0.805)	0.769 (0.616-0.911)	0.863 (0.680-1.02)	0.993 (0.759-1.18)	1.10 (0.818-1.30)
6-hr	0.146 (0.126-0.172)	0.185 (0.161-0.218)	0.237 (0.205-0.278)	0.279 (0.239-0.325)	0.336 (0.284-0.389)	0.380 (0.317-0.440)	0.427 (0.350-0.493)	0.474 (0.381-0.549)	0.539 (0.423-0.625)	0.591 (0.452-0.687)
12-hr	0.081 (0.071-0.094)	0.103 (0.090-0.119)	0.130 (0.113-0.150)	0.151 (0.131-0.175)	0.181 (0.154-0.208)	0.203 (0.171-0.233)	0.226 (0.188-0.260)	0.249 (0.205-0.287)	0.280 (0.225-0.324)	0.305 (0.240-0.355)
24-hr	0.049 (0.043-0.055)	0.062 (0.055-0.070)	0.080 (0.071-0.090)	0.095 (0.084-0.106)	0.115 (0.101-0.129)	0.131 (0.114-0.146)	0.147 (0.128-0.165)	0.164 (0.142-0.184)	0.188 (0.160-0.211)	0.206 (0.174-0.232)
2-day	0.026 (0.023-0.030)	0.034 (0.030-0.038)	0.044 (0.039-0.050)	0.053 (0.047-0.059)	0.064 (0.057-0.072)	0.074 (0.065-0.083)	0.083 (0.073-0.094)	0.094 (0.081-0.105)	0.108 (0.092-0.122)	0.120 (0.101-0.135)
3-day	0.019 (0.017-0.021)	0.024 (0.021-0.027)	0.031 (0.028-0.035)	0.037 (0.033-0.042)	0.046 (0.040-0.051)	0.052 (0.046-0.059)	0.060 (0.052-0.067)	0.067 (0.058-0.076)	0.078 (0.067-0.088)	0.087 (0.073-0.098)
4-day	0.015 (0.013-0.017)	0.019 (0.017-0.021)	0.025 (0.022-0.028)	0.030 (0.026-0.033)	0.036 (0.032-0.041)	0.042 (0.037-0.047)	0.048 (0.042-0.054)	0.054 (0.047-0.061)	0.063 (0.054-0.071)	0.070 (0.059-0.079)
7-day	0.009 (0.008-0.010)	0.012 (0.011-0.013)	0.016 (0.014-0.018)	0.019 (0.017-0.021)	0.023 (0.020-0.026)	0.027 (0.023-0.030)	0.030 (0.026-0.034)	0.034 (0.030-0.039)	0.040 (0.034-0.045)	0.044 (0.037-0.050)
10-day	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.012 (0.011-0.013)	0.014 (0.013-0.016)	0.018 (0.015-0.020)	0.020 (0.018-0.023)	0.023 (0.020-0.026)	0.026 (0.022-0.029)	0.030 (0.025-0.034)	0.033 (0.028-0.037)
20-day	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.011 (0.009-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.015 (0.013-0.017)	0.017 (0.015-0.019)	0.018 (0.016-0.020)
30-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)
45-day	0.003 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.010 (0.009-0.012)
60-day	0.002 (0.002-0.002)	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.008 (0.007-0.009)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

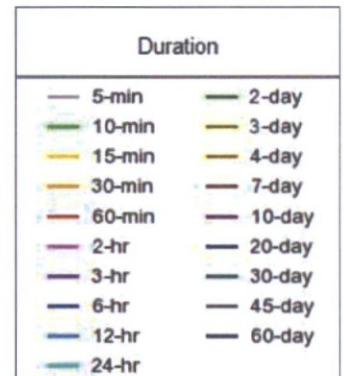
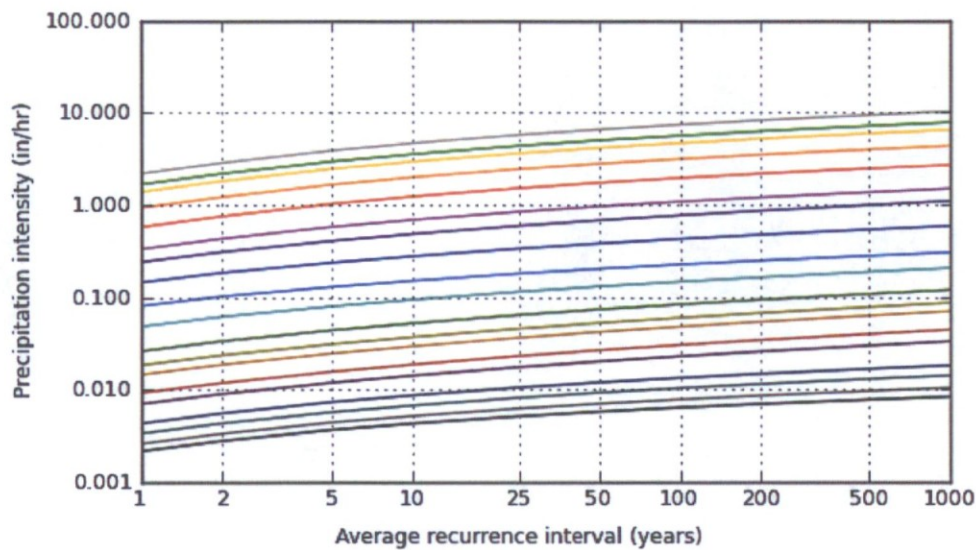
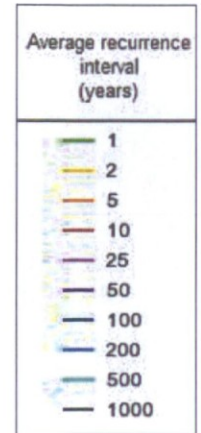
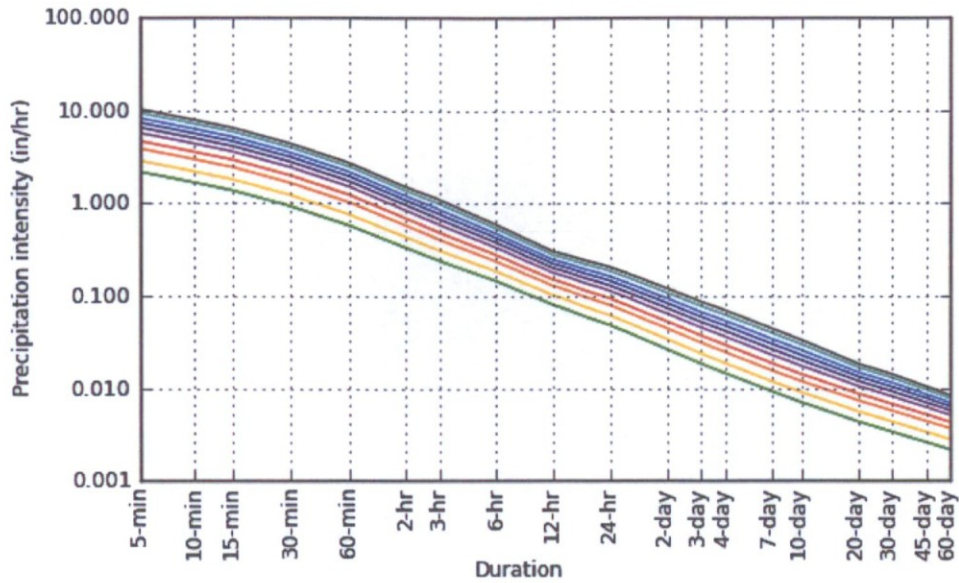
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)



## PF graphical

PDS-based intensity-duration-frequency (IDF) curves  
Latitude: 33.4917°, Longitude: -111.9290°



## Maps & arials

Small scale terrain





Large scale terrain



Large scale map

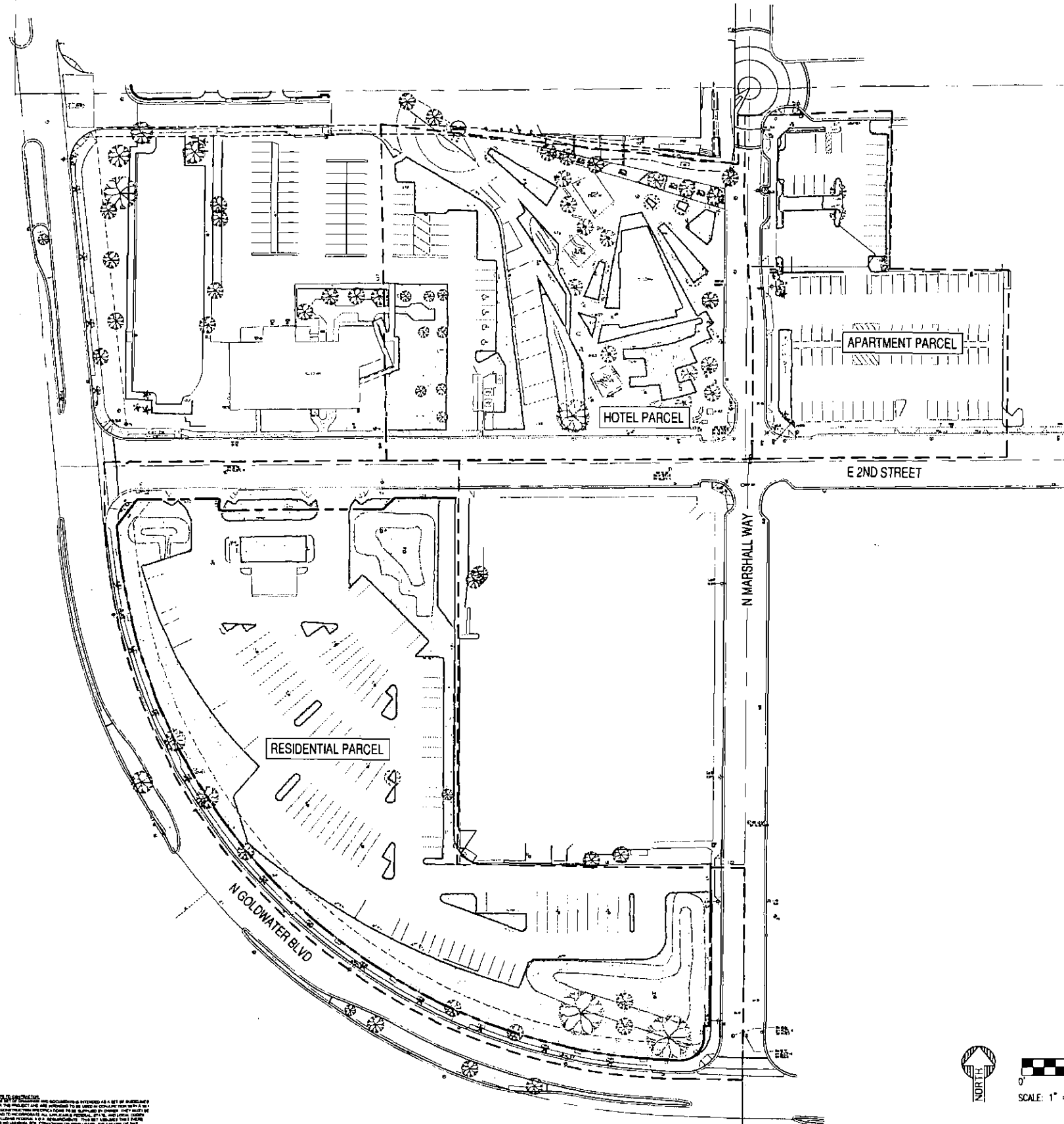


Large scale aerial

## *APPENDIX II*

### *Calculations*

MUSEUM SQUARE  
EXISTING CONDITIONS Cwt MAP  
E 2ND STREET & N MARSHALL WAY SCOTTSDALE, AZ 85251

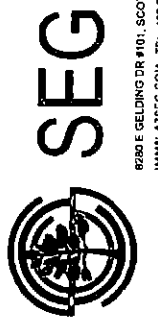


RESIDENTIAL PARCEL  
DESERT: 1.23 AC  
IMPERVIOUS: 2.52 AC  
TOTAL: 3.75 AC  
Cwt = .79

HOTEL PARCEL  
DESERT: 0.84 AC  
IMPERVIOUS: 1.45 AC  
TOTAL: 2.09 AC  
Cwt = .80

APARTMENT PARCEL  
DESERT: 0.08 AC  
IMPERVIOUS: 1.21 AC  
TOTAL: 1.29 AC  
Cwt = .92

DESERT LSCP = @ Cwt=0.45  
IMPERVIOUS = @ Cwt=0.95



8230 E GELDING DR #101 SCOTTSDALE, ARIZONA 85260  
WWW.AZSEG.COM TEL 480.588.7228

MACDONALD  
DEVELOPMENT CORPORATION

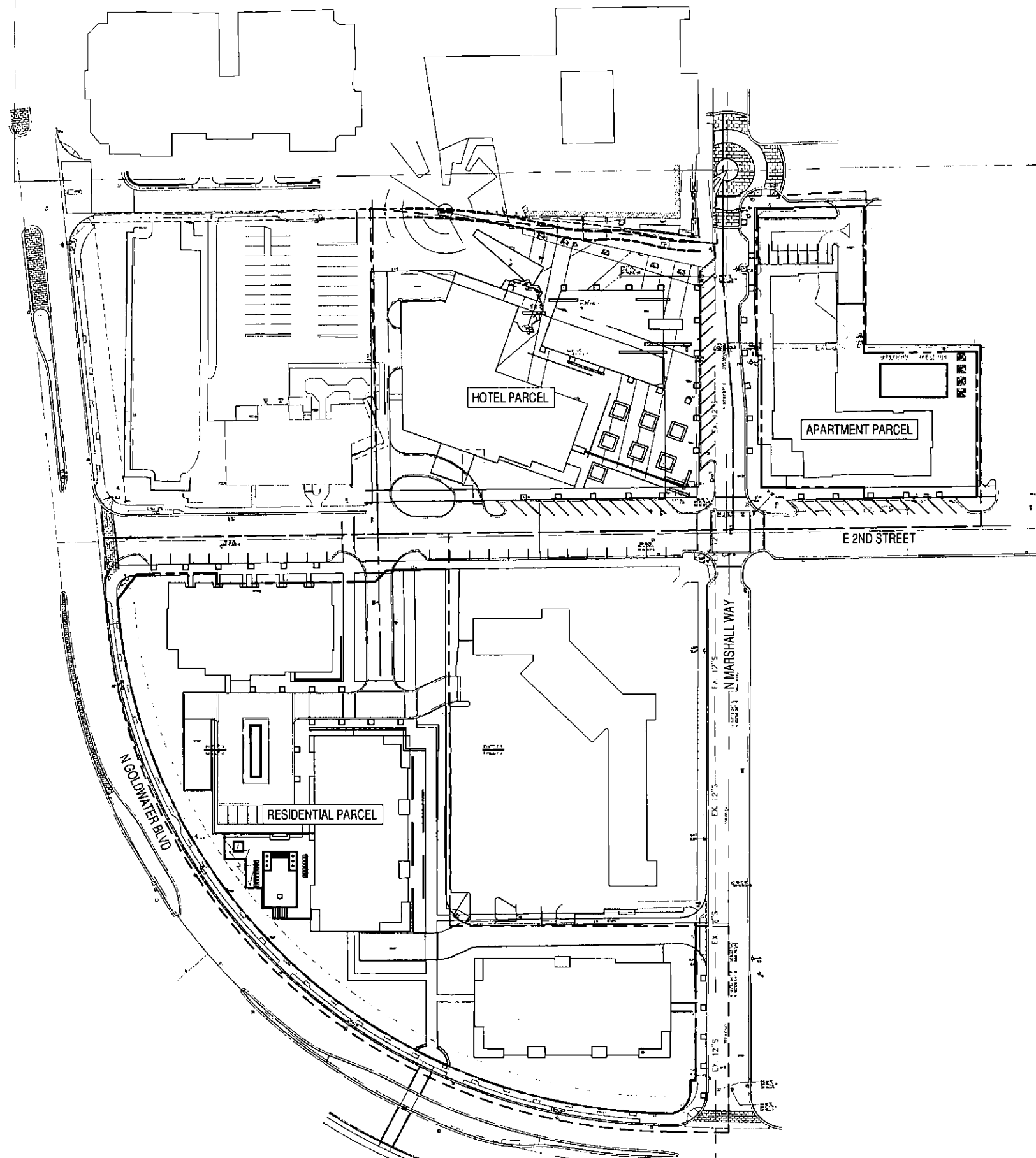
PROJECT MUSEUM SQUARE	
LOCATION E. 2ND STREET & N. MARSHALL WAY SCOTTSDALE, AZ 85251	
DRAWN	SANTIAGO
DESIGNED	SANTIAGO
CHECKED	COUNSELL
PROJ. MGR.	FAKIH
DATE:	06/14/2018
ISSUED FOR:	
REVISION NO.:	DATE:
1	
2	
3	
4	
JOB NO.: 180109	
SHEET TITLE: EXISTING CONDITIONS Cwt MAP	
SHEET NO.: EXHIBIT 'A'	

ARIZONA  
Professional Engineer  
No. 644 of State of Arizona  
The Seal of the State of Arizona  
The Seal of the State of Arizona  
The Seal of the State of Arizona

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MUSEUM SQUARE  
PROPOSED CONDITIONS Cwt MAP  
E 2ND STREET & N MARSHALL WAY SCOTTSDALE, AZ 85251



**RESIDENTIAL PARCEL**  
DESERT: 1.08 AC  
IMPERVIOUS: 2.67 AC  
TOTAL: 3.75 AC  
CW=.81

<u>HOTEL PARCEL</u>	
DESERT:	0.37 AC
IMPERVIOUS:	1.72 AC
TOTAL:	<u>2.09 AC</u>
	CW=.86

APARTMENT PARCEL	
DESERT:	0.37 AC
IMPERVIOUS:	0.92 AC
TOTAL:	<u>1.29 AC</u>
	CW=.81

DESERT LSCP = @ Cwt=0.45

IMPERVIOUS = @ Cwt=0.95



**G  
E  
S**

8280 E GELDING DR #101, SCOTTSDALE, ARIZONA 85260  
WWW.AZSEQ.COM TEL. 480.588.7226

MIALC DONALD  
DEVELOPMENT CORPORATIONPROJECT  
MUSEUM SQUARE

LOCATION  
E. 2ND STREET & N. MARSHALL WAY  
SCOTTSDALE, AZ 85251

DRAWN \_\_\_\_\_ SANTIAGO  
DESIGNED \_\_\_\_\_ SANTIAGO  
CHECKED \_\_\_\_\_ COUNSELL  
PROD. MGR. \_\_\_\_\_ FAKIH

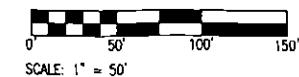
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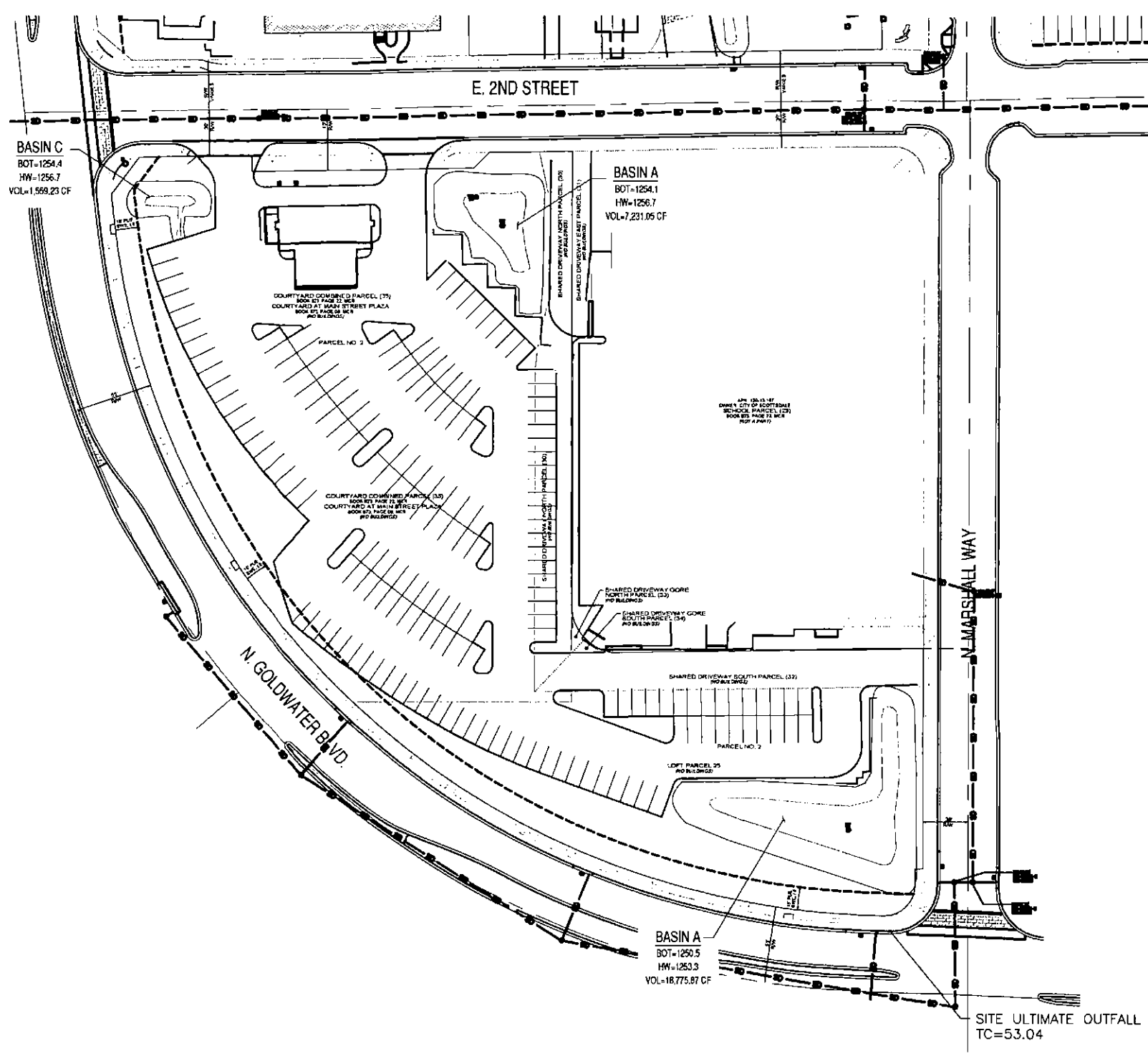
JOB NO.: 180109

PROPOSED CONDITIONS  
Cmt MAP

SHEET NO. 1  
EXHIBIT 'B'



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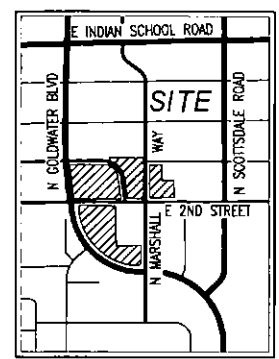


MUSEUM SQUARE  
EXISTING RETENTION EXHIBIT  
E 2ND STREET & N MARSHALL WAY SCOTTSDALE, AZ 85251

DEVELOPER  
MACDONALD DEVELOPMENT  
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PHONE: 480-367-2100  
ATTN: ALI FAKIH

ARCHITECT  
SWABACK  
7550 E. McDONALD DRIVE  
SCOTTSDALE, ARIZONA 85250  
PHONE: 480-367-2100  
ATTN: CHRIS MCKIBBEN

BENCHMARK  
BENCHMARK IS  
ELEVATION = NAVD 88



VICINITY MAP  
SCALE: NTS

**BASIS OF BEARING**  
THE BASIS OF BEARING AND ALL MONUMENTATION SHOWN HEREON IS BASED ON THE EAST LINE OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, USING A BEARING OF NORTH 07°09'25" WEST AS SHOWN ON THE MINOR LAND DIVISION PLAT RECORDED IN BOOK 1288, PAGE 43, MARICOPA COUNTY RECORDS.

**LEGAL DESCRIPTION**  
A PORTION OF CENTER PARCEL 17, A PORTION OF WALKWAY SOUTH PARCEL 16, A PORTION OF TRANSIT PARCEL 14 AND COURTYARD PARCEL 35, SHARED DRIVEWAY NORTH PARCEL 30, LOFT PARCEL 25, SHARED DRIVEWAY SOUTH PARCEL 32, SHARED DRIVEWAY GORE NORTH PARCEL 33 AND SHARED DRIVEWAY GORE SOUTH PARCEL 34 AS SHOWN ON THE FINAL PLAT OF LOLOMA RECORDED IN BOOK 597, PAGE 6, MARICOPA COUNTY RECORDS AND THE RE-PLAT OF LOLOMA RECORDED IN BOOK 823, PAGE 22, MARICOPA COUNTY RECORDS. A PORTION OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.



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MACDONALD  
DEVELOPMENT CORPORATION

PROJECT  
MUSEUM SQUARE  
LOCATION  
E. 2ND STREET & N. MARSHALL WAY  
SCOTTSDALE, AZ 85251

DRAWN: SANTIAGO  
DESIGNED: SANTIAGO  
CHECKED: SANTIAGO  
PROD. MGR: COUNSELL  
FAKIH

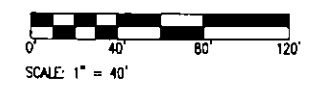
DATE: 06/08/2018  
ISSUED FOR:

REVISION NO.	DATE
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JOB NO.: 180109  
SHEET TITLE:

EXISTING RETENTION EXHIBIT

SHEET NO.:



ARIZONA  
REGISTERED PROFESSIONAL ENGINEER  
No. 12345  
Exp. 12/31/2020

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injection pipe with cement grout, remove the top six feet of the settling chamber and place a 2-foot thick cement plug four feet below the ground surface. In addition to the above referenced sections, ADEQ needs to be properly notified of the closure.

6. National Pollution Discharge Elimination System

*For Construction AZDEQ*

The Developer will file a Notice of Intent (NOI) form with the ~~U.S. Environmental Protection Agency~~ and will copy the City within 72 hours of commencement of construction. The Developer will also provide to the City within the same time frame a copy of the Stormwater Pollution Prevention Plan (SWPPP).

*Any Facilities - (Restaurants - Retail using etc code materials, paints, oils etc) will need to file SWPPP with AZDEQ along with NOI*

### III. EXISTING CONDITIONS

#### A. ZONING AND LAND USE

The existing zoning is shown in Figure 1. The existing site has the following land uses: Parking, Retail Shops on Main Street, Stagebrush Theatre, Loloma Transit Station, and the Scottsdale Artists' School. (Refer to Exhibit A)

#### B. ONSITE DRAINAGE CHARACTERISTICS (EXISTING AND PHASE I)

The site is in an urbanized part of downtown Scottsdale. The maximum difference in elevation across the site is approximately eight (8) feet. The entire site is developed or under construction.

Exhibit A shows the delineation of onsite existing drainage boundaries and the pre-development 100-year flow rates estimated for these drainage areas.

There are three existing stormwater storage basins on site as shown in Exhibit A. A volume for each basin has been estimated based on a City topographic map and are listed in Table III.1.

**Table III.1: Existing Stormwater Storage Basins**

NO.	LOCATION	ESTIMATED VOLUME (CU.FT.)
1	South of Artists' School	13,800
2	SE Corner of Goldwater / 2 <sup>nd</sup> Street	1,867
3	West of Artists' School	5,967
	Total	21,633

The following existing storm drains are located in the vicinity of the project:

1. 54-inch storm drain located in Goldwater Blvd., connecting to the storm drain in Second Street.
2. 72-inch storm drain in Second Street, connecting to a storm drain in Scottsdale Road.

**EXISTING ON-SITE RETENTION BASIN VOLUMES**

<b>BASIN A</b>					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
1254.1	1,286			0.00	Basin Bottom
		2.58	7,231.05		
1256.7	4,320			<b>7,231.05</b>	Basin HWE

<b>BASIN B</b>					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
1250.5	3,623			0.00	Basin Bottom
		2.80	18,775.87		
1253.3	9,789			<b>18,775.87</b>	Basin HWE

<b>BASIN C</b>					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
1254.4	204			0.00	Basin Bottom
		2.25	1,559.23		
1256.7	1,182			<b>1,559.23</b>	Basin HWE

27,566.14    Total Volume (AC. FT.)

<b>EXISTING STORMWATER BASIN VOLUME SUMMARY</b>		
BASIN ID	Volume from field      topographic survey (c.f.)	*From Referenced Main Street Plaza Scottsdale Report (c.f.)
A	7,231	5,967
B	18,777	13,800
C	1,559	1,867
<b>TOTAL</b>	<b>27,567</b>	<b>21,634</b>



<b>BASIN 3 (CONDOMINIUM)</b>					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
1254.0	1,603			0.00	
		1.00	2,004.00		
1255.0	2,405			<b>2,004.00</b>	Basin HWE

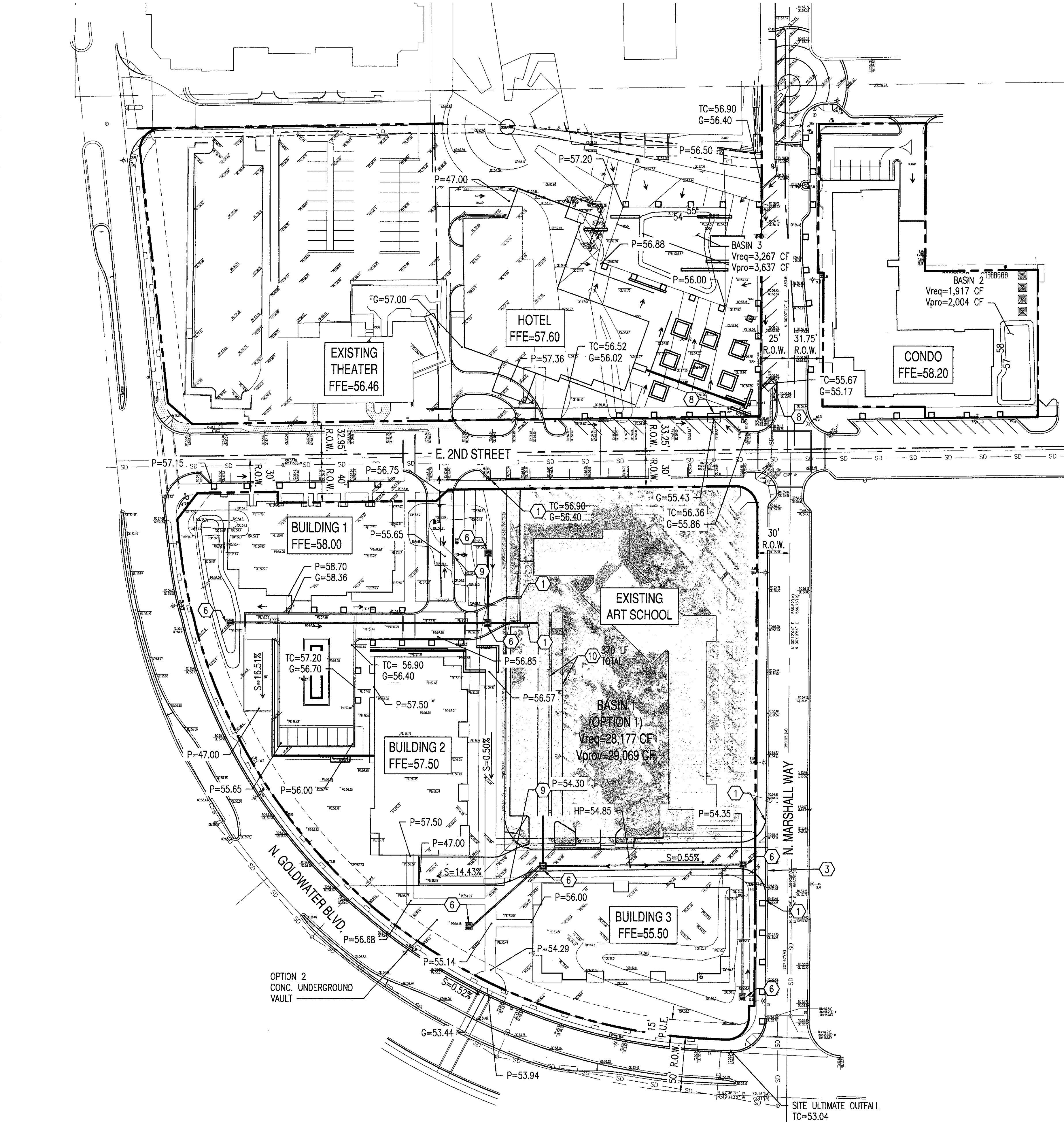
<b>BASIN 4 (HOTEL)</b>					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
1257.0	3,148			0.00	
		1.00	3,636.50		
1258.0	4,125			<b>3,636.50</b>	Basin HWE



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## *APPENDIX III*

### *Preliminary Grading and Drainage Plan*



# MUSEUM SQUARE PRELIMINARY GRADING AND DRAINAGE PLAN E 2ND STREET & N MARSHALL WAY SCOTTSDALE, AZ 85251

## DEVELOPER

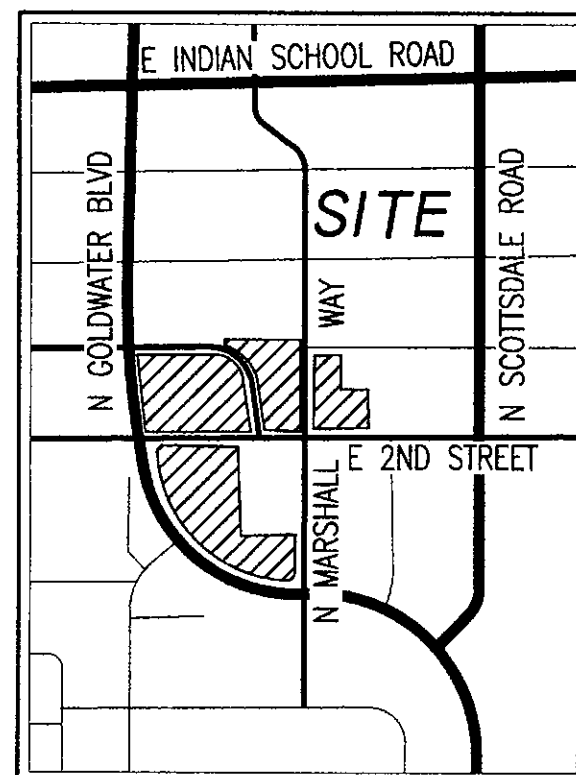
MACDONALD DEVELOPMENT  
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PHOENIX, ARIZONA 85012  
PHONE:  
ATTN:

## ARCHITECT

SWABACK  
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SCOTTSDALE, ARIZONA 85250  
PHONE: 480-367-2100  
ATTN: CHRIS MCKIBBEN

## ENGINEER

SUSTAINABILITY ENGINEERING GROUP  
8280 E. GELDING DR. SUITE #101  
SCOTTSDALE, ARIZONA 85260  
PHONE: 480-588-7226  
ATTN: ALI FAKIH



VICINITY MAP  
SCALE: NTS

## BENCHMARK

BENCHMARK IS A CITY OF SCOTTSDALE BRASS CAP IN HAND-HOLE LOCATED AT THE INTERSECTION OF SCOTTSDALE ROAD AND INDIAN SCHOOL ROAD BEING THE NORTHEAST CORNER OR SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST.

ELEVATION = 1260.366' NAVD 88

## BASIS OF BEARING

THE BASIS OF BEARING AND ALL MONUMENTATION SHOWN HEREON IS BASED ON THE EAST LINE OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, USING A BEARING OF NORTH 00°09'25" WEST AS SHOWN ON THE MINOR LAND DIVISION PLAT RECORDED IN BOOK 1288, PAGE 43, MARICOPA COUNTY RECORDS.

## LEGAL DESCRIPTION

A PORTION OF CENTER PARCEL 17, A PORTION OF WALKWAY SOUTH PARCEL 16, A PORTION OF TRANSIT PARCEL 14 AND COURTYARD PARCEL 35, SHARED DRIVEWAY NORTH PARCEL 30, LOFT PARCEL 25, SHARED DRIVEWAY SOUTH PARCEL 32, SHARED DRIVEWAY GORE NORTH PARCEL 33 AND SHARED DRIVEWAY GORE SOUTH PARCEL 34 AS SHOWN ON THE FINAL PLAT OF LOLOMA RECORDED IN BOOK 597, PAGE 6, MARICOPA COUNTY RECORDS AND THE RE-PLAT OF LOLOMA RECORDED IN BOOK 823, PAGE 22, MARICOPA COUNTY RECORDS, A PORTION OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

## KEY NOTES

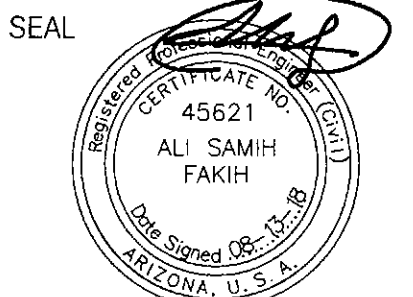
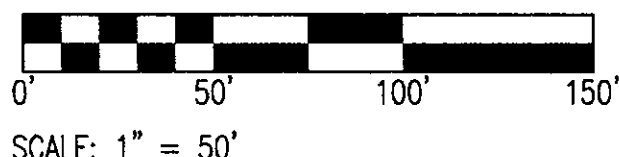
- 1 MATCH EXISTING GRADE
- 2 NEW 6" CURB AND GUTTER
- 3 REMOVE EXISTING CURB AND REPLACE 2' WIDE VALLEY GUTTER
- 4 NEW 5' WIDE SIDEWALK
- 5 REMOVE EXISTING SIDEWALK
- 6 CATCH BASIN
- 7 24" DIA. HDPE STORM PIPE
- 8 REMOVE EXISTING CATCH BASIN AND CONSTRUCT NEW CATCH BASIN
- 9 CONSTRUCT CURB OPENING
- 10 10' DIA. CMP

## PROPOSED LEGEND

TC TOP OF CURB ELEVATION  
G GUTTER ELEVATION  
CURB & GUTTER  
PUBLIC UTILITY EASEMENT (P.U.E.)  
STORM PIPE  
STORMCEPTOR  
FLOW ARROWS  
FG FINISHED GRADE  
FL FLOW LINE  
IE INVERT ELEVATION

## EXISTING LEGEND

SPOT ELEVATION  
FIRE HYDRANT  
CENTER LINE  
PROPERTY LINE



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**MACDONALD**  
DEVELOPMENT CORPORATION

PROJECT: MUSEUM SQUARE  
LOCATION: E 2ND STREET & N. MARSHALL WAY SCOTTSDALE, AZ 85251

DRAWN: HARMOUICHE  
DESIGNED: HARMOUICHE  
CHECKED: COUNSELL  
PROJ. MGR: FAKIH

DATE: 08/13/2018  
ISSUED FOR: REZONING

REVISION NO.: DATE:  
JOB NO.: 180109

SHEET TITLE: PRELIMINARY GRADING AND DRAINAGE PLAN

SHEET NO.: C3.00



## *APPENDIX IV*

### *Final Drainage Report for Marshall Way Goldwater Blvd. to Indian School Road*

***Marshall Way  
Goldwater Blvd to Indian School Road***

**Drainage Report**

Project No.: TD01/1015013.02

***August 8, 2017***

Prepared For:



City of Scottsdale Capital Project Management

Plan #	2774-17
Case #	
Q-S #	
<input checked="" type="checkbox"/> Accepted	
<input type="checkbox"/> Corrections	
N. Baronas	8-14-17
Reviewed By	Date

**Dibble  
Engineering®**

7878 North 16<sup>th</sup> Street  
Suite 300  
Phoenix, Arizona 85020  
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www.dibblecorp.com



## Table of Contents

<b>I. INTRODUCTION .....</b>	<b>1</b>
<b>II. EXISTING CONDITIONS ANALYSIS .....</b>	<b>2</b>
A. Goldwater Blvd to 2 <sup>nd</sup> Street.....	2
B. 2nd Street to 1st Street.....	4
C. 1 <sup>st</sup> Street to Main Street .....	4
D. Main Street to 1 <sup>st</sup> Avenue .....	5
E. 1 <sup>st</sup> Avenue to Indian School Road .....	5
<b>III. ROADWAY DRAINAGE CRITERIA .....</b>	<b>5</b>
<b>IV. DRAINAGE RESULTS .....</b>	<b>6</b>
A. Hydrology.....	6
B. Hydraulics.....	6
<b>V. RESULTS .....</b>	<b>8</b>
A. Goldwater to 2 <sup>nd</sup> Street.....	8
B. 2 <sup>nd</sup> Street to 1 <sup>st</sup> Street .....	8
C. 1 <sup>st</sup> street to Main Street.....	8
D. Main Street to 1 <sup>st</sup> Avenue .....	9
E. 1 <sup>st</sup> Avenue west of Marshall Way .....	9

## List of Tables

Table 1 - Flow Splits.....	6
Table 2 - Q100 Street Drainage Results.....	7

## List of Figures

Figure 1 - Vicinity Map .....	1
Figure 2 - Flow2D Preliminary Model Flows .....	3

## Appendices

- A – Drainage Area Map
- B – DDMS Output
- C – HydraFlow Cross Section Capacity Results
- D – Cross –Sectional Flow Split Calculations
- E –Catch Basin and Gutter Flow Calculations



## **I. INTRODUCTION**

Marshall Way lies in the heart of Old Scottsdale, set in the art district just west of the Civic Center. Marshall is a minor collector connecting Goldwater Boulevard with Indian School Road and up to 5<sup>th</sup> Avenue. Main Street crosses Marshall Way just north of midway between Goldwater Blvd and Indian School Road and as is one of the main art gallery corridors in Downtown Scottsdale.

From halfway between 1<sup>st</sup> Street and Main St, this area is within the Main Street Design District, part of the Downtown Character Area. North of Indian School, Marshall Way continues north into the Marshall Way-Craftsman's Court and Fifth Avenue Districts.

Marshall Way is a vehicular, bike, and pedestrian link between the districts; however, the perception of the Marshall Way corridor south of Indian School Road is dark and not secure. Low levels and non-continuous roadway lighting have a significant role in these perceptions.

The area is known for ponding issues. The City and Flood Control District of Maricopa County are currently developing the Lower Indian Bend Wash Flood Study and a preliminary Flow2D model has been prepared.

This study has developed contributing watershed boundaries, runoff concentration points, intersection flow splits and cross-sections of key roadway locations on Marshall Way and 1<sup>st</sup> Avenue.

The hydraulic analysis only looked at the 100-year discharge and compared that value to the computer street capacity at 14 cross section locations.

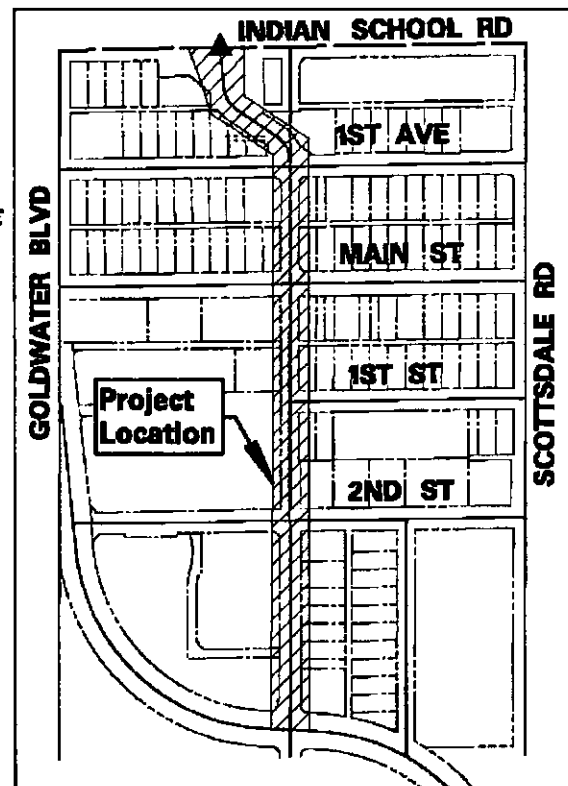


Figure 1- Vicinity Map

## **II. EXISTING CONDITIONS ANALYSIS**

### **A. Goldwater Blvd to 2<sup>nd</sup> Street**

Marshall Way is a 46 foot wide (back of curb (bc)-bc) paved roadway with two lanes and parallel parking on both sides. The right-of-way width is 60' with 65' at 2<sup>nd</sup> Street, but the ownership is listed in the County Assessor's as a City owned parcel as part of a plat, not as dedicated right-of-way. The right-of-way line on the west side is within the existing sidewalk. An 8-foot wide sidewalk is attached to the left curb and a 5-foot sidewalk is attached right. Goldwater Boulevard has a storm drain which outfalls into the Indian Bend Wash. At Marshall Way, the storm drainage has a 24-inch storm drain lateral which connects two existing catch basins located at each curb return on Marshall Way. The catch basins are City of Phoenix Standard curb opening type with 17-foot wings to the north. The west side of Marshall Way is vertical curb and the east side is primarily rolled curb.

The Flow2D model does not show significant issues with flow depth within this segment. The Flow2D model is shown in Figure 2.

An existing cross section, Cross Section 1, was prepared which showed the existing street has capacity for the 100-year discharge.





Figure 2 - Flow2D Preliminary Model Flows

Source: (FCDMC)



### **B. 2nd Street to 1st Street**

Marshall Way in this segment is 32-foot wide except where southbound just north of 2<sup>nd</sup> Street. Parallel parking is allowed on the right. The right of way varies but starts out as 55-feet north of 2<sup>nd</sup> Street and reduces to 50 feet up to 1<sup>st</sup> Street. The east side sidewalk is 5-foot in width and attached. The west side sidewalk is variable in width and incorporated into the Museum of the West's pedestrian sidewalks. Two driveways are located on the east side. No driveways to the west. Roadway drainage is confined to the street drainage except near 2<sup>nd</sup> Street where a storm drain is located in 2<sup>nd</sup> street and flows easterly to Indian Bend Wash. Two catch basins are located at the west curb returns on 2nd Street. These are curb opening inlets with 17-foot wings to each side of a 3-foot wide basin. The 72-inch diameter storm drain was constructed as part of the Second Street Storm Drain, 69<sup>th</sup> Street to Wells Fargo Avenue, Project No. F-1704, as-built date 3/11/93.

An additional catch basin with an 18-inch diameter lateral is located on Marshall Way at the northwest curb return which drains the west curb and gutter to the 72-inch storm drain. The storm drain as-builts show a 30-inch diameter stub-out was designed to the north but not installed, suggesting the possibility that the storm drain was designed for additional flow at Marshall Way. The profile of the storm drain include a grade break at the west side Marshall Way at the catch basin laterals. The steeper grade to the east would have developed a higher capacity in the storm drain.

In addition, scuppers are located at the Low Impact Design linear basin and bio swales located on the Museum of the West property. These curb openings allow some of the runoff to exit the roadway and be used to irrigate the landscaped areas on the site. A recent rainstorm shows that flows can leave the roadway into the landscape areas but the capacity is small so that any additional rain will begin to pond along the west curb.

At the 2<sup>nd</sup> street intersection, the west curb line bulbs out into the road, creating a parking lane along the west curb north of this pint. The Scottsdale Trolley uses this parking lane for the bus stop location. The east curb has a recessed bus pullout just north of the 2<sup>nd</sup> Street intersection with a valley gutter to convey runoff to 2<sup>nd</sup> Street and then easterly.

The Flow2D shows depths of flow over the curb in this segment. The model shows that the incoming flow from the north splits at 1<sup>st</sup> Avenue with a significant percentage of the runoff flowing easterly in the 1<sup>st</sup> Avenue right-of-way.

To the west is identified watershed ON4 which is bounded by south of 1<sup>st</sup> Street to 2<sup>nd</sup> Street, Goldwater to Marshall. The Flow2D model shows that the majority of this watershed discharges into 2<sup>nd</sup> Street with only the east half of the Museum of the West building and Marshall right-of-way discharging into Marshall Way.

### **C. 1<sup>st</sup> Street to Main Street**

Marshall Way in this segment is 32-foot wide except where southbound parallel parking is allowed in the northerly portion toward Main Street. Parallel parking is allowed on the right. The right of way varies but starts out as 55-feet north of 2<sup>nd</sup> Street and reduces to 50 feet up to Main Street. The east side sidewalk is 5-foot in width and attached. The west side sidewalk is variable in width and incorporated into the Museum of the West's pedestrian sidewalks. Three driveways are located on the east side. No driveways to the west. The curb and gutter is vertical to the west and on the east side from the alley north to Main Street, and rolled from 1<sup>st</sup> Street to the alley.



Runoff from the north enters this segment at Main Street. The Flow2D model shows a flow split at Main Street with a slightly larger amount heading south in Marshall Way than in Main Street. The Flow2D model also shows ponding issues.

The Arizona School of Real Estate and Business has the rolled curb in front. The finished floor (elevation 1258.78) of the building is 1.0 higher than the back of rolled curb. The existing rolled curb limits the capacity of the street section.

#### ***D. Main Street to 1<sup>st</sup> Avenue***

The roadway width in this segment varies from 24-feet at the bump-outs to 50-feet where there is parallel parking to the east and 45° parking to the west. The portion from the alley to 1st Avenue is 40 feet wide and parallel parking is allowed on both sides. The right-of-way is 50 feet wide. The 45° parking has part of the parking space and curb outside of the right-of-way. The sidewalks are 5 feet wide and attached. Two driveways are located within this section at the alleyway halfway between Main Street and 1<sup>st</sup> Avenue.

North of Main Street, the west curb has a bump-out island with an 8.25-foot wide open scupper along the main curb line. The east curb also has a bump-out with a 2.5-foot wide covered scupper.

#### ***E. 1<sup>st</sup> Avenue to Indian School Road***

The roadway is 40 feet wide and is signed for "No Parking". The right-of-way varies but it is generally 70 feet in width. The land is platted but the right-of-way is not shown as dedicated right-of-way. Marshall Way has a reverse curve to the west to match into the location of Marshall Way to the north of Indian School Road. The sidewalks are 8 feet wide and detached with a 5-foot landscape buffer. One driveway is located on each side of Marshall Way. Runoff comes from the south curb of Indian School Road at Goldwater Boulevard into the Marshall Way roadway. Part of the land bounded by 1<sup>st</sup> Avenue to Indian School Road and Goldwater Blvd. to Marshall Way flows onto the Marshall Way roadway and part into the 1<sup>st</sup> Avenue roadway. Runoff is conveyed through curb and gutter within the right of way. At the intersection of 1<sup>st</sup> Avenue and Marshall Way, the flow splits east and south. The majority is shown in the Flow2D model to flow south.

### **III. ROADWAY DRAINAGE CRITERIA**

The City of Scottsdale (COS) is the owner on this project and will be responsible for the maintenance of the roadway and drainage system following construction completion. Per the design criteria, this report will look at the 100-year design discharge and compare to the street capacity. For the 100-year design discharge, the full right-of-way can be used with the test of the water surface elevation not being greater than the adjacent finish floor elevation. This was completed in two steps. First the existing roadway capacity was calculated with the software program HydraFlow. Cross-section were developed from the existing surface developed from survey data collected in January 2017. The Cross sections were edited using the survey data and field photo graphs to support any changes.

If the 100-year discharge exceeded the gutter capacity, than the right-of-way capacity was calculated. If the design discharge exceed the street capacity for both the existing and proposed condition, the results were note and the finished floor elevations were checked.

The proposed cross sections were developed from the plans. If the design plans required changes, the cross sections were revised until the criteria was met and the plans were revised accordingly.

Fourteen cross sections were developed at key locations as shown on the figure below.

#### **IV. DRAINAGE RESULTS**

##### **A. Hydrology**

The rational Method was incorporated in the hydrology by using the Drainage Design Management System (DDMS) software by the FCDMC. The City of Scottsdale criteria was used include a 5-minute minimum time of concentration.

Nine watersheds were delineated for the area. Four, labeled ON1 through ON4, cover the area comprised of urban buildings and roadways. Five, labeled ON5 through ON9, cover the open areas or eastern half street sections of Indian School Road and Marshall Way. Appendix A shows the watershed boundaries.

The Flow2D model shows runoff flows splitting at the roadway intersections in the 100-year design flow scenario. The Flow2D results were used to develop flow splits for the rational method routing. The Flow2D model shows flows splits at 1<sup>st</sup> Avenue, Main Street and 1<sup>st</sup> Street. At 2<sup>nd</sup> Street, the southerly flowing Marshall Way runoff turns and flows east in 2<sup>nd</sup> Street. Using the Flow2D GIS depth grid, each intersection flow split was determined and shown in **Table 1**. After review, the Flow Splits were also determined by using the cross-sectional area method using Hydraflow to determine the cross sectional area to determine the percentage of flow on the south leg versus the east leg of an intersection flow split. The results are shown in Appendix D.

**Table 1 - Flow Splits**

Intersection	Flow Split (% south/% east)	Flow Split (% south / % east)
	By Flow2D	By Cross Section
Marshall Way / 1 <sup>st</sup> Avenue	75% / 25%	69% / 31%
Marshall Way / Main Street	60% / 40%	46% / 54%
Marshall Way / 1 <sup>st</sup> Street	20% / 80%	41% / 59%

Routing is based on adding the subareas. No attenuation is accounted for. A test case was performed at Concentration Point No. 2 located at Marshall Way and Main Street. The additive sub-basin routing was compared to the combined watershed area as one. The sub-basin routing was calculated to be 64.1 and the single watershed was calculated to be 61.9, a 3% difference. The sub-basin routing yields a more conservative analysis.

Appendix B shows the DDMS results.

##### **B. Hydraulics**

In the hydraulic design, HydraFlow software was used and incorporated FCDMC Manning's n-values were used as well as the City's composite street section n-value of 0.015. Any offsite decomposed granite or dirt areas used an n-value of 0.03.



Table 2 below show the results of the hydraulic analysis. Appendix B shows the existing and proposed sections with the street capacity calculations.

**Table 2 - Q100 Street Drainage Results**

Cross Section	Station	Existing Street Capacity (cfs)	Proposed Street Capacity (cfs)	Q100 (cfs)	Meets Existing	Meets Proposed	
1	10+75	57.76	56.66	13.1	Yes	Yes	#1
2	16+32	10.79	10.79	37.5	No	No	
3	17+00	60.34	74.1	34.7	Yes	Yes	
4	17+90	38.66	33.88	26.7	Yes	Yes	
5	18+85	104.48	104.48	26.7	Yes	Yes	
6	19+70	59.5	45.19	37.0	Yes	Yes	#2
7	20+94	24.81	37.59	36.1	No	Yes	
8	21+60	41.62	35.5	35.1	Yes	Yes	#3
9	23+15	31.59	31.59	28.2	Yes	Yes	
10	24+30	59.56	30.93	28.1	Yes	Yes	#4
11	25+50	57.13	39.05	26.2	Yes	Yes	
12	25+82/33' Lt	42.13	27.14	22.0	Yes	Yes	
13	25+82/93' Lt	38.17	38.17	22.0	Yes	Yes	
14	26+20	27.62	44.95	13.0	Yes	Yes	

Notes:

#1

Existing street section is under capacity. No changes in proposed conditions. Q100 flow will overtop curb and flow into parking area as sheet flow with low depth. Catch basin at northwest corner of 2nd St and Marshall has 5.2 cfs capacity at 8-inch depth (including depression).

#2

Revised island in Project Plans to a 3-foot scupper and reduced width 1' to obtain design criteria.

#3

Revised NW ramp on Marshall Way only, deleted proposed changes to island.

#4

Widened 1st Avenue SW bulb out 1 foot to south from plans to add street drainage capacity to meet design criteria.

## **V. RESULTS**

### **A. Goldwater to 2<sup>nd</sup> Street**

The project proposes to reduce the street capacity. The west curb will be moved into the road approximately 5 feet and the east side 1 foot. The west catch basin will be replaced with the same size as the existing catch basin, a City of Phoenix Standard P1569-1 with a 17-foot wing.

The existing catch basin is in sump condition at an approach slope of 0.58%. A similar on-grade catch basin is located on the northwest corner of Goldwater Boulevard and Marshall Way along the north curb of Goldwater Blvd. At the intersection, the street transverse cross slope transitions to a valley gutter which flows to the east. North of the intersection, the cross slope is 2.0%. The DDMS reports shows a 10-year design discharge for street drainage is 6.1 cfs. The spread at the design flow is 15 feet. See the calculations in Appendix E. The spread will encroach 5 feet into the 10-foot wide. The 20-foot catch basin has a capacity of 5.4 cfs (with 25% clogging factor). The yields 0.7 cfs which will not be intercepted by the catch basin and flow to the next downstream catch basin located in Goldwater Blvd. This condition is consistent with the existing conditions. The calculations conducted herein are based on a larger area of the parking lot which may actually not reach the street but be directed to on-site retention.

### **B. 2<sup>nd</sup> Street to 1<sup>st</sup> Street**

The cross sections were cut at the existing and proposed bottlenecks for the 100-year drainage flow. Cross Section 2 shows the existing cross section does not meet the design flow. The runoff will overtop the eastern curb into a parking lot and flow south easterly back into 2<sup>nd</sup> Street. The proposed project does not change this condition.

Cross section 3 has excess street drainage capacity. The new driveway and curb does not reduce the capacity. The loss of the bus pullout does not affect the capacity because of the downstream bottleneck at cross section 2.

An existing sump catch basin is located at the northwest corner of Marshall Way and 2<sup>nd</sup> Street. The capacity of the catch basin has been calculated to be 5.2 cfs. The calculations are in Appendix E.

Cross section 4 also has the runoff capacity in the proposed condition.

Cross section 5 also has runoff capacity. The east curb is proposed to be moved into the road approximately 5 feet.

### **C. 1<sup>st</sup> street to Main Street**

Cross section 6 is located at a point where the bulb out could create a ponding which would impact the Building on the northeast corner of 1<sup>st</sup> Street and Marshall Way. Finished floor elevations were surveyed to be 1257.85. Cross section 6 capacity is 45.1 cfs at the finished floor in the proposed condition. The design discharge is 37.0 cfs.



Cross Section 7 is located at the driveway and alleyway at Station 20+94. The east side alley driveway will be extended into the street effectively reducing the street drainage capacity. The curb will be revised to a vertical which adds 2-inch of additional height to the water surface before the runoff spills into the alley. Anecdotal evidence suggests that this condition occurs in heavy storms in the current condition. The proposed changes will increase the capacity of the street by raising the back of sidewalk elevation.

Cross section 8 is located at a proposed parking island at Station 21+60. The island is required in order to place a street light at this location. The analysis showed that the original island design need to be revised to include a 3-foot wide scupper and the width of the island into the street reduced by 1 foot to provide the design capacity.

#### ***D. Main Street to 1<sup>st</sup> Avenue***

Cross section 9 is located just north of the roundabout where existing curb bulb outs extend into Marshall Way. Originally, the plans proposed to extend the NW ramp into the Marshall Way street to match the exiting bulb out. This required reducing the west scupper width which bought the design capacity of the street below the design discharge. Options to mitigate the loss in capacity failed to alleviate the issue. This report recommends the design be revised to match the existing condition.

Cross Section 10 is located at the alleyway north of Main Street. Alleys are located both east and west of Marshall Way. The proposed condition is to extend the driveways into Marshall Way parking lane to create pocket for street lighting. The west side is an extension of the curb line to the north so the alley extension does not affect drainage. The east side does reduce the street drainage capacity but it still has a capacity greater than the design discharge.

Cross section 11 is located one the south leg of the 1<sup>st</sup> Avenue and Marshall Way intersection where two new curb bulb-outs are proposed. The street capacity will continue to be greater than the design discharge here.

#### ***E. 1<sup>st</sup> Avenue west of Marshall Way***

On 1<sup>st</sup> avenue west of Marshall Way, the building at the southwest corner has a finished floor lower than the street curb elevation. An existing swale made from bricks is located at the doorway on the north side of the building. The swale drains to the east around the building in a rock swale. The finished floor elevation is 1260.95 and the brick swale elevation is 0.20-0.40 feet lower.

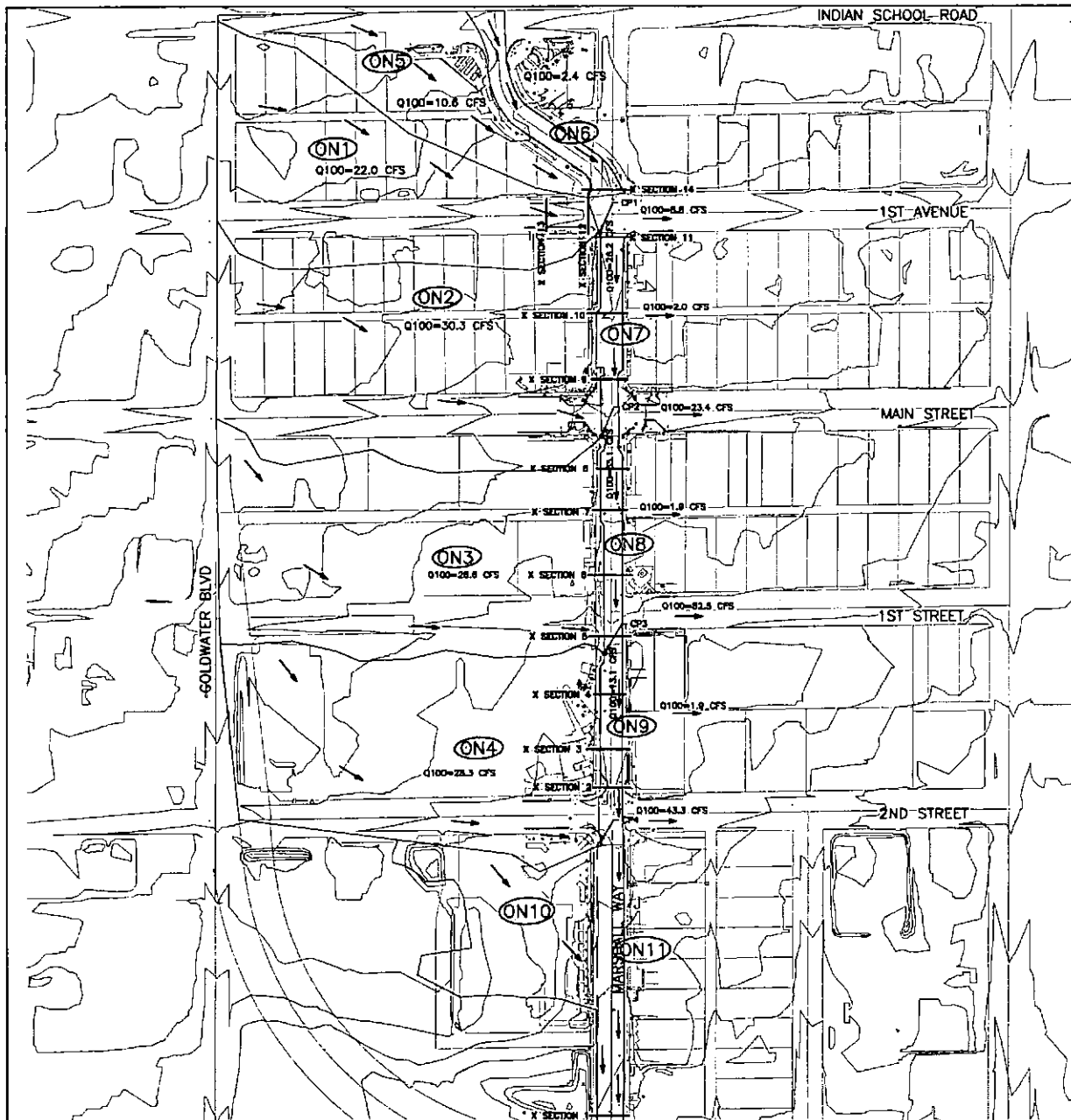
Cross section 12 is located at the west curb returns of the intersection. The returns are proposed to be bulb-outs to define the parking lanes and reduce the pedestrian crossing distance. The top of sidewalk is capacity of the street section. A scupper is planned for the low flows in the 1<sup>st</sup> Avenue south gutter to be routed to the Marshall Way west curb. The design as shown in the 100% plans did not have the capacity to convey the runoff by a minor amount. In order to mitigate this, the south bulb-out curb will be moved to the south 1-foot to provide the required capacity in the 1<sup>st</sup> Avenue street section.

Cross section 13 is located adjacent to the building's doors to determine the existing roadway capacity. The design discharge was determined to be below the street capacity.

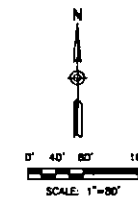
## APPENDIX A WATERSHED MAP







CONCENTRATION POINT	TOTAL Q100 (CFS)	TOTAL Q10 (CFS)
CP1	35.00	18.30
CP2	58.50	30.40
CP3	65.60	33.60
CP4	43.30	22.40



DRAINAGE EXHIBIT

MARSHALL WAY PEDESTRIAN  
IMPROVEMENTS STUDY

DIBBLE PROJECT - 1015013.02

**Dibble**  
Engineering

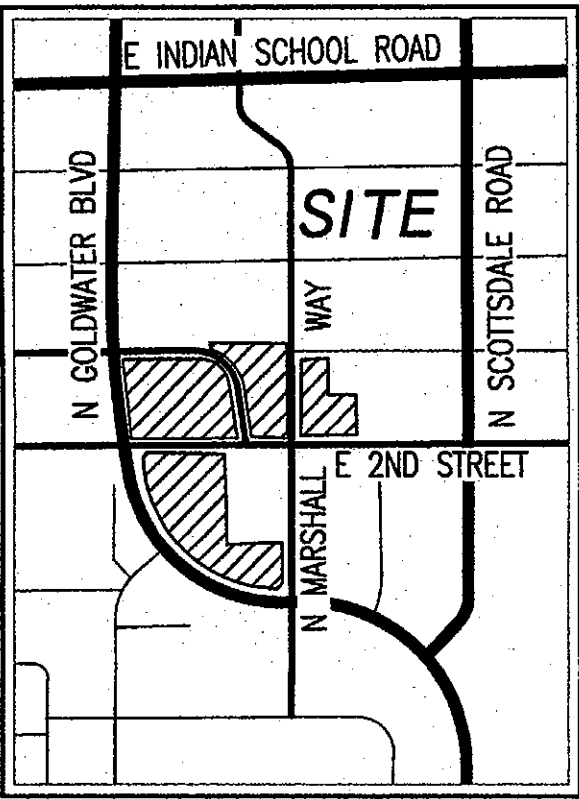
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MUSEUM SQUARE  
PRELIMINARY GRADING AND DRAINAGE PLAN  
E 2ND STREET & N MARSHALL WAY SCOTTSDALE, AZ 85251

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VICINITY MAP  
SCALE: NTS

BENCHMARK  
BENCHMARK IS A CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE LOCATED AT THE INTERSECTION OF SCOTTSDALE ROAD AND INDIAN SCHOOL ROAD BEING THE NORTHEAST CORNER OR SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST.  
ELEVATION = 1260.366' NAVD 88

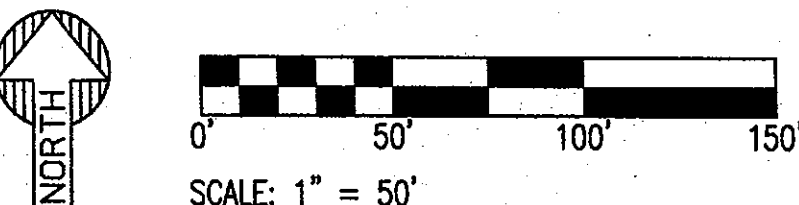
BASIS OF BEARING  
THE BASIS OF BEARING AND ALL MONUMENTATION SHOWN HEREON IS BASED ON THE EAST LINE OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, USING A BEARING OF NORTH 00°09'25" WEST AS SHOWN ON THE MINOR LAND DIVISION PLAT RECORDED IN BOOK 1288, PAGE 43, MARICOPA COUNTY RECORDS.

LEGAL DESCRIPTION  
A PORTION OF CENTER PARCEL 17, A PORTION OF WALKWAY SOUTH PARCEL 16, A PORTION OF TRANSIT PARCEL 14 AND COURTYARD PARCEL 35, SHARED DRIVEWAY NORTH PARCEL 30, LOFT PARCEL 25, SHARED DRIVEWAY SOUTH PARCEL 32, SHARED DRIVEWAY GORE NORTH PARCEL 33 AND SHARED DRIVEWAY GORE SOUTH PARCEL 34 AS SHOWN ON THE FINAL PLAT OF LOLOMA RECORDED IN BOOK 597, PAGE 6, MARICOPA COUNTY RECORDS AND THE RE-PLAT OF LOLOMA RECORDED IN BOOK 823, PAGE 22, MARICOPA COUNTY RECORDS, A PORTION OF THE NORTHEAST QUARTER OF SECTION 27, TOWNSHIP 2 NORTH, RANGE 4 EAST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA.

- KEY NOTES
- 1 MATCH EXISTING GRADE
  - 2 NEW 6" CURB AND GUTTER
  - 3 REMOVE EXISTING CURB AND REPLACE 2' WIDE VALLEY GUTTER
  - 4 NEW 5' WIDE SIDEWALK
  - 5 REMOVE EXISTING SIDEWALK
  - 6 CONSTRUCT SCUPPER
  - 7 24" DIA. HDPE STORM PIPE
  - 8 REMOVE EXISTING CATCH BASIN AND CONSTRUCT NEW CATCH BASIN
  - 9 CONSTRUCT CURB OPENING

- PROPOSED LEGEND
- TC TOP OF CURB ELEVATION
  - G GUTTER ELEVATION
  - == CURB & GUTTER
  - - - PUBLIC UTILITY EASEMENT (P.U.E.)
  - STORM PIPE
  - ⊙ STORMCEPTOR
  - FLOW ARROWS
  - FG FINISHED GRADE
  - FL FLOW LINE
  - IE INVERT ELEVATION

- EXISTING LEGEND
- × SPOT ELEVATION
  - ⊙ FIRE HYDRANT
  - - - CENTER LINE
  - - - PROPERTY LINE



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8280 E. GELDING DR #101, SCOTTSDALE, ARIZONA 85260  
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MACDONALD DEVELOPMENT CORPORATION

PROJECT: MUSEUM SQUARE

LOCATION: E 2ND STREET & N. MARSHALL WAY SCOTTSDALE, AZ 85251

DRAWN: SANTIAGO  
DESIGNED: SANTIAGO  
CHECKED: SANTIAGO  
PROJ. MGR.: COUNSELL  
FAKIH

DATE: 06/14/2018

ISSUED FOR:

REVISION NO.: DATE:

JOB NO.: 180109

SHEET TITLE: PRELIMINARY GRADING AND DRAINAGE PLAN

SHEET NO.: C3.00

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